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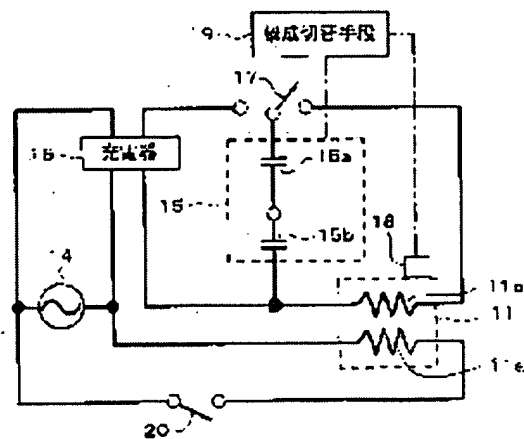
JP

(54) HEATING DEVICE, FIXING DEVICE AND IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a fixing roller temperature from fluctuating when a large- capacity capacitor is used as an auxiliary power source.

SOLUTION: With the heating device provided with a heating part 11 whose temperature is raised by heat generation of heat-generating members 11a, 11b, a main power source 14 supplying power to the heat-generating member 11a with the use of a commercial power source, and a large-capacity capacitor composed of a plurality of cells 15a, 15b used as an auxiliary power source 15 charged by the commercial power source and supplying power to the heat- generating member 11b, connection of the plurality of the cells 15a, 15b is structured to be variable at least at the time of discharge.



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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to image formation equipments, such as heating apparatus which heats heated objects, such as paper and a film, an anchorage device and a copying machine, a printer, and facsimile.

[0002]

[Description of the Prior Art] Image formation equipments, such as a copying machine, a printer, and facsimile, have the process which forms an image on the heated object as heated objects, such as a regular paper and OHP paper. It is an electrophotography method that this image formation equipment is widely adopted from rapidity, image quality, cost, etc. also in it although various image formation methods are realized. By the electrophotography method, a non-established toner image is formed on the heated object which are heated objects, such as a regular paper and OHP paper, and there is a fixing process which fixes the non-established toner image on this heated object by heat and the pressure with an anchorage device. As this anchorage device, present most heating roller methods are adopted from fields, such as rapidity and safety.

[0003] It is the method which the mutual pressure-welding section to which the pressure welding of the heating roller heated by exoergic members, such as a halogen heater, and the pressurization roller which counters this heating roller and is arranged is carried out, and it is called the anchorage device of a heating roller method with the nip section is formed, and is made to pass a heated object between a heating roller and a pressurization roller, and fixes the non-established toner image on a heated object to it by heat and the pressure.

[0004] When fluoro-resin is covered as a mold release layer to rodding of a heating roller in the anchorage device of a heating roller method, since the quality of the material itself is hard, the problem on image quality which is explained below produces fluoro-resin. The toner image on a heated object has irregularity microscopically, and if the front face of a heating roller is hard, it cannot be followed, but the microscopic adhesion over the front face of a heating roller becomes low. For this reason, the fine gloss nonuniformity in the solid section generates the toner image after fixing on a heated object between the part which the heating roller contacted, and the part which a heating roller does not contact.

[0005] In monochrome copying machine, since whenever [image quality demand-] was not so high compared with a full colour copying machine, the heating roller of an anchorage device was what covered fluoro-resin, and was enough for the above rodding. However, in developing to a printing field as improvement in the speed of equipment progresses, the demand of high-definition-izing is becoming high.

[0006] On the other hand, in a full colour copying machine, the demand to high-definition-izing is very large compared with monochrome copying machine. By covering an elastic layer (heat-resistant rubber) to rodding of a heating roller so that gloss nonuniformity of a toner image cannot happen easily, he is trying to obtain the fixing image of the outstanding image quality which makes high adhesion of the front face of a heating roller, and the toner layer on a heated object by the own elasticity of rubber of a heating roller, and does not have gloss nonuniformity, and this technique has been developed to monochrome copying machine.

[0007] The roller with which rodding consists of metals, such as iron and aluminum, is mainly being used for a heating roller, and its heat capacity is large. For this reason, a heating roller method has the fault that the long build up time for several minutes to about ten minutes is required in carrying out a temperature up till around about 180 degrees C which is usable temperature at the time of use.

[0008] Then, power is supplied to a heating roller, and he is maintaining the temperature of a heating roller at preheat temperature a little lower than usable temperature, and is trying to start to usable temperature immediately with image formation equipment at the time of use also at the time of the standby to which a user does not perform image formation. Excessive energy unnecessary for image formation was consumed also at the time of the standby

which this is for a user not to wait for the temperature up of a heating roller, and is not using image formation equipment. In addition, the consumption energy at the time of this standby also has the results of an investigation of going up to about 7 - 80 percent of the consumption energy of the whole image formation equipment.

[0009] In recent years, energy-saving regulation is enacted from the rise of environmental conservation awareness in each country. Law concerning the Rational Use of Energy is revised and strengthened at home, and energy-saving programs, such as Energy Star and ZESM (Zero Energy Star Mode), are enacted even in the U.S. In case power-saving is attained in order to correspond to these regulations and programs, when consumption energy is reduced among the consumption energy of the whole image formation equipment at the time of large standby of a rate, since the effectiveness of power-saving is large, it is desirable to make the electric power supply to a heating roller into zero at the time of intact of image formation equipment. However, if the supply voltage to the heating roller at the time of standby is made into zero with the conventional anchorage device, in order that the heating up time of a heating roller may start at the time of a reuse, the latency time will become long, and a user's user-friendliness will get worse. For this reason, when the configuration which raises the temperature of a heating roller promptly realizes the image formation equipment of an energy-saving mold, it is needed, for example, in Above ZESM, 10 or less seconds is demanded of re-starting, and it requires.

[0010] In order to shorten the heating up time of a heating roller, it is effective to lower the heat capacity of the whole anchorage device also including a pressurization roller. Then, the anchorage device it was made satisfied [ anchorage device ] with the combination of the pressurization belt with which the nip section which a heated object passes is formed between the fixing roller containing an elastic layer and this fixing roller, and the pressurization member arranged inside this pressurization belt of high-definition-izing, improvement in the speed, energy saving, and reinforcement is indicated by JP,11-133776,A.

[0011] moreover, to JP,2001-92281,A It is a thing aiming at satisfying high definition, energy saving, and a longevity life. In the anchorage device which fixes the toner image on imprint material to said imprint material by heating and pressurization The translucency base of the shape of a cylinder which has the film-like rotation member which was inscribed in and prepared the fixed heating element, and the heat radiation member which counters said film-like rotation member and is prepared, and which emits a heat ray inside, and has translucency to said heat ray, The anchorage device characterized by consisting of a rotation member for heat ray fixing of the shape of a roll which prepared the translucency elastic layer and the heat ray absorption layer which absorbs said heat ray on the outside of this translucency elastic layer in the outside of this translucency base is indicated.

[0012] Moreover, in order to shorten the heating up time of a heating roller, it is good to enlarge the injection energy of the unit time amount over the exoergic member which heats a heating roller, i.e., rated power. There are actually some which set supply voltage to 200V and shorten the heating up time of a heating roller in high-speed image formation equipment with a high image formation rate. However, in the general office of Japan, 100V15A of a power source is common, 1500W are an upper limit, it is necessary to give construction special to the power-source related part of an image formation equipment installation for making it correspond to the supply voltage which is 200V, and this cannot be said to be the general solution approach for shortening the heating up time of a heating roller.

[0013] Moreover, the image formation equipment which raises the total injection power to the exoergic member of an anchorage device, using the source power supply of 100V15A two lines is also put in practical use. However, with this image formation equipment, when there is no place which has two plug sockets in near, there is fault that it cannot install. Furthermore, when the supply voltage over the exoergic member of an anchorage device is increased simply, safety poses a problem. although the temperature of a heating roller rises abruptly by supplying large power to an exoergic member, when a system hangs up and control of the supply voltage over an exoergic member becomes impossible, the risk of ignition is markedly alike and becomes high. When this has the too early temperature up of a heating roller, it is for the temperature of a heating roller to exceed the ignition point temperature of paper, by the time safety devices, such as a thermal fuse and a thermostat, operate. As mentioned above, even if it was going to carry out the temperature up of the heating roller for a short time until now, the actual condition was that the upper limit of injection energy is not raised.

[0014] In order to realize energy saving by increasing the maximum supply voltage over an exoergic member, it is proposed that using auxiliary power and supplying power to an exoergic member also from auxiliary power is proposed, and it uses a rechargeable battery as auxiliary power which can be charged. As a rechargeable battery, a lead accumulator, a KADONIKA cell, etc. are typical. However, since a rechargeable battery requires time amount for charge and requires several hours for charging full, it cannot be repeatedly used for a day.

[0015] Moreover, it will deteriorate, if charge and discharge are repeated repeatedly, capacity falls, and a rechargeable battery has the property in which a life becomes short, so that it discharges by the high current. Also by the KADONIKA cell generally made long lasting by the high current, the count of a repeat of charge and

discharge is about 500 - 1000 times, and if 20 times of charges and discharges are repeated to a day, a life will come in about one month. In this, the time and effort of a changing battery will be taken and running costs, such as cell cost, will also be attached very highly. Moreover, a rechargeable battery needs to take out and charge to the equipment exterior etc., if the charging time charges Nighttime for a long time for this reason. Moreover, the discharge of a rechargeable battery is little-by-little, and it is difficult for it to take out large power for a short time. Moreover, if it continues charging when there is no need for discharge, gas occurs, and a rechargeable battery causes failure and is not safe. Furthermore, as a device for [ , such as using the sulfuric acid of a liquid in a lead accumulator, ] office, it is not desirable. It was difficult to realize practically to supply power to an exoergic member also from a rechargeable battery according to such faults.

[0016] In order to solve the fault of such a rechargeable battery, the anchorage device which used mass capacitors, such as an electric double layer capacitor, as auxiliary power is proposed. The count of a repeat of charge and discharge is almost unrestricted, a mass capacitor does not almost have degradation of a charge property, and its periodical maintenance is unnecessary. Moreover, the charging time also has the description that a mass capacitor can be made about dozens of seconds from several seconds, to the dc-battery which is a rechargeable battery requiring several hours. Moreover, since it is possible to pass a dozens of A to hundreds of A high current in an electric double layer capacitor, the electric power supply in a short time is possible. Moreover, the mass capacitor is [ no generating of gas etc. ] and is safe even if it continues charging. Furthermore, since standing losses can decline, an electrical potential difference can fall and an electric double layer capacitor can reduce a supply voltage automatically if it carries out predetermined time discharge, its safety is high. If such a mass capacitor is used as auxiliary power, the power which exceeds the limitation of the power of a source power supply for a short time for several seconds to dozens of seconds when an anchorage device starts can be supplied to an anchorage device. Moreover, since a mass capacitor uses up standing losses for a short time, a supply voltage can reduce it after predetermined time amount from discharge starting, and it can realize a configuration small the temperature rise of a heating roller and safe. For this reason, it is possible to realize the short anchorage device of build up time, and to make dependability, endurance, and safety high.

[0017] In JP,5-232839,A, it has the auxiliary power other than a main power supply, and the heating apparatus which does not increase power to a heater for this auxiliary power to heat a fixing roller, but supplies power to the heating element of another network is indicated. The anchorage device of the energy-saving mold which used the auxiliary power other than a main power supply is indicated by JP,10-10913,A. In this anchorage device, the rechargeable battery as auxiliary power is not a thing for the purpose of supplying the power of two level from a single power source, and heightening the maximum supply voltage from the supply voltage of only a main power supply.

[0018] The image formation equipment which used auxiliary power other than a main power supply, such as a rechargeable battery and a primary cell, for JP,10-282821,A, and gave various functions to it is indicated. The heating apparatus which used the mass capacitor other than a main power supply as auxiliary power is indicated by JP,2000-315567,A. According to this heating apparatus, at the time of a standup, build up time can be shortened by assisting a source power supply by auxiliary power, and it becomes energy saving.

[0019] Having dropping pro DAKUTIBI tea, and a battery loading distinction means distinguish loading of a battery and a charge capacity monitor means supervise the charge capacity of a battery, and dropping pro DAKUTIBI tea during the charge to a battery by the distinction result of a battery loading distinction means or the monitor result of a charge capacity monitor means is indicated in image-formation equipment equipped with the source power supply and the battery by JP,2000-075737,A. Moreover, using the battery, charging a battery externally or charging Nighttime, since the charging time is long is indicated by JP,2000-075737,A.

[0020] As a fixing method which realizes a short-time temperature up in image formation equipment, the thing of a configuration of having rolled about the film made of heat-resistant resin is in the perimeter of a tabular ceramic heater. Since the heat capacity of a ceramic heater becomes small, this can shorten build up time and is put in practical use with the image formation equipment of the following low speeds by 30-sheet/.

[0021] However, in order to correspond to high-speed image formation equipment further from now on, it is necessary to make this thick because of breakage prevention of a film. If temperature of a film is not raised as a problem in this case before a film goes into nip, the need that resin heats a film from the upper section before going into the nip section since thermal conductivity is worse than a metal and heat stops fully getting across to a heated object in nip will come out. For this reason, in order for the area of the plate-like part of a heater to become large and to perform a more rapid temperature up, a power source high as a power source which supplies power is required for a heater.

[0022]

[Problem(s) to be Solved by the Invention] In an anchorage device and heating apparatus using the mass capacitor

mentioned above as auxiliary power, the following technical problems are clear now. In order to shorten starting time amount, while reducing the heat capacity of a fixing roller (heating roller), it is necessary to perform the electric power supply in large power to a fixing roller. And in order to obtain large power by auxiliary power, when wiring and the load of a circuit are considered, it is more desirable than a high current to use the auxiliary power of the high voltage.

[0023] As shown in drawing 4, it is tended sharply however, to change the temperature of a fixing roller, in order to supply large power to the heater as a heating element at a stretch, in case ON of an electric power supply / auxiliary power using a mass capacitor (mass capacitor) is used it being off and controlling fixing roller temperature. For this reason, when the temperature of a fixing roller changed in the middle of the image on a heated object, nonuniformity was made to image quality and there was fault of reducing image quality.

[0024] Moreover, although gloss nonuniformity stops being able to happen to rodding of a heating roller easily as mentioned above by what covered the elastic layer (heat-resistant rubber) and high definition-ization can be attained, an elastic layer has bad thermal conductivity, and at the time of continuation \*\*\*\*, the skin temperature of a heating roller falls and it causes poor fixing. In order to avoid this poor fixing, with some image formation equipments, when it becomes below fixed temperature with the skin temperature of a heating roller, fixable is secured by reducing a process rate, and the thermally conductive badness of the elastic layer of a heating roller serves as hindrance of improvement in the speed.

[0025] Moreover, in order to use up the power which a mass capacitor holds by the starting time amount for several seconds to dozens of seconds, the configuration which takes out large power from a mass capacitor is required.

Power = since it is an electrical-potential-difference x current, it is possible to obtain large power from a mass capacitor by making output voltage of a mass capacitor high, or enlarging the output current of a mass capacitor.

[0026] However, maximum current is [ about 10A-12A ] an upper limit, and the halogen heater usually used for heating of a heating roller is difficult to enlarge maximum current. This is because the life of a halogen heater becomes short, when a high current is supplied to a halogen heater. Therefore, in order to supply large power to a halogen heater, using a halogen heater as an exoergic member, the configuration using the power source with large output voltage as a power source of supply which supplies power to a halogen heater needed to be taken.

[0027] However, a mass capacitor has the property that the electrical potential difference per one cel is as low as [ about ] several V, from the first. It is for preventing the solution inside the cel of a mass capacitor electrolyzing this, and a little more than 1 volt and an organic system are also about a little less than 3 volts in a drainage system. For this reason, in order to heat by using as an exoergic member the halogen heater used conventionally, it is necessary to use what connected the cel of a mass capacitor to dozens of about ten - piece serial as a power supply unit which supplies the about [ 50-100V ] high voltage to a halogen heater.

[0028] However, when the power supply unit of the high voltage is installed in the interior of equipment, there are the following problems. Although the interior of equipment is accessed in many cases in case maintenance check of equipment is carried out, a power supply terminal may be touched without meaning during an activity, and an electrical shock may occur. Moreover, a policy for a user to be also able to consider editing the interior of equipment by processing of a record paper jam etc., and prevent electrification also to this is required.

[0029] Moreover, with the configuration which the accumulation-of-electricity capacity of one capacitor cel of a mass capacitor is becoming large enough, connects many capacitor cels with a serial, and obtains the high voltage and large power, energy sufficient in some of just capacitor cels to raise whenever [ heated temperature ] may be obtained. However, in order to raise the electrical potential difference of a mass capacitor until now, the number of capacitor cels needed to be increased, and so to speak, the capacitor cel of an excessive capacity needed to be prepared as a power supply section configuration. However, since a mass capacitor has the low consistency of energy, the volume of current is large and its cost is also still high, it is indispensable to reduce the number of capacitor cels.

[0030] That is, with the configuration using a halogen heater as an exoergic member, since it was necessary to use a capacitor cel excessive in energy in order to raise the supply voltage to a halogen heater, the power source which supplies power to a halogen heater had the problem that cost will also become [ the volume ] large highly.

[0031] Moreover, another important technical problem is overshoot of temperature. The thermistor is used for temperature detection in current and a fixing roller. Although a thermistor becomes quite small and the reaction rate has also been improving, with the configuration with a heating up time there are many power supplies to a halogen heater, and short, the technical problem that it became easy to overshoot temperature detection of a thermistor behind time more highly than a value predetermined in temperature came out.

[0032] This invention was made that the above-mentioned technical problem should be solved, can make temperature fluctuation small, can use as many maintenance energy of a capacitor as possible, can make a temperature rise quick, can shorten build up time, can reconcile high-definition-izing and improvement in the

speed, and aims at offering the heating apparatus which can raise the separability of a heating unit and a toner image.

[0033] Other purposes of this invention can lose the nonuniformity of an image, and are to offer the image formation equipment which can make output quality high. Other purposes of this invention can prevent electrification by lowering the output voltage of an auxiliary power source, and are to offer the high heating apparatus, the anchorage device, and image formation equipment of safety. Other purposes of this invention are to offer the heating apparatus, the anchorage device, and image formation equipment which can reduce the volume of auxiliary power, can make an installation tooth space small, and can be made into a low price. Other purposes of this invention are to offer the heating apparatus, the anchorage device, and image formation equipment which can reduce overshoot of temperature.

[0034]

[Means for Solving the Problem] In the heating apparatus which has the mass capacitor which consists of two or more cels used as auxiliary power which invention which relates to claim 1 in order to attain the above-mentioned purpose is charged from the heating unit which temperature goes up by generation of heat of an exoergic member, the main power supply which a source power supply is used and supplies power to said exoergic member, and a source power supply, and supplies power to said exoergic member, it carries out as the configuration which carries out adjustable [ of the connection of two or more of said cels ] at the time of discharge at least.

[0035] Invention concerning claim 2 is taken as the configuration which changes said two or more cels to juxtaposition and a serial in heating apparatus according to claim 1.

[0036] In heating apparatus according to claim 1 or 2, invention concerning claim 3 has a detection means to detect the situation of this equipment, and changes connection of said two or more cels using the detection information on this detection means.

[0037] Invention concerning claim 4 uses a temperature detection means to detect the temperature of said heating unit as said detection means, in heating apparatus according to claim 3.

[0038] In heating apparatus according to claim 4, when said heating unit is beyond predetermined temperature, invention concerning claim 5 connects said two or more cels to juxtaposition, and supplies power to said heating unit from these two or more cels.

[0039] In heating apparatus according to claim 4, when said heating unit does not reach predetermined temperature, invention concerning claim 6 connects said two or more cels to a serial, and supplies power to said heating unit from this cel.

[0040] Invention concerning claim 7 uses the continuation heating number-of-sheets information on a heated object instead of the detection information on said detection means in heating apparatus according to claim 3.

[0041] Invention concerning claim 8 is taken as the configuration which makes adjustable the number of trains of the parallel connection of two or more of said cels, and carries out adjustable [ of the connection of said two or more cels ] in heating apparatus according to claim 7.

[0042] In the heating apparatus according to claim 7 which invention concerning claim 9 considered as the configuration which carries out adjustable [ of the connection of a mass capacitor of two or more cels ], said heating unit has an elastic layer.

[0043] In heating apparatus according to claim 9, the thickness of said elastic layer of invention concerning claim 10 is 0.1mm or more.

[0044] Invention concerning claim 11 prepares a mold release layer in the outermost layer of said elastic layer in heating apparatus according to claim 9 or 10.

[0045] Invention concerning claim 12 drops the output voltage of said auxiliary power according to predetermined directions in the heating apparatus which has the main exoergic member which generates heat by supplying power from the main power supply in which a steady electric power supply is possible, the auxiliary power which can be charged, the auxiliary exoergic member which generates heat by supplying power from this auxiliary power, and the heating component heated by said main exoergic member and said auxiliary exoergic member.

[0046] Invention concerning claim 13 is equipped with connectable electrical load and the alternative connecting means which connects this electrical load to said auxiliary power alternatively to said auxiliary power in heating apparatus according to claim 12, and this alternative connecting means connects said electrical load to said auxiliary power according to said directions.

[0047] In heating apparatus according to claim 13, said electrical load of invention concerning claim 14 is a resistance heating element.

[0048] In heating apparatus according to claim 13, said electrical load of invention concerning claim 15 is a motor.

[0049] In heating apparatus according to claim 12, said auxiliary power consists of two or more power sources connected to the serial, and invention concerning claim 16 separates a part of two or more of these power sources

according to said directions, and drops the output voltage of said auxiliary power.

[0050] Invention concerning claim 17 has an access detection means to detect access of the operator inside [ concerned ] equipment, in heating apparatus given in any 1 term of claims 12-16, and considers the detection result of this access detection means as said directions.

[0051] In invention concerning claim 18, in heating apparatus according to claim 17, said access detection means detects the discharge directions to said auxiliary power with an active maintenance worker.

[0052] In heating apparatus given in any 1 term of claims 12-18, the output voltage with said high auxiliary power of invention concerning claim 19 is direct current voltage.

[0053] Invention concerning claim 20 has the pressure-up means which carries out the pressure up of the output voltage of said auxiliary power in the heating apparatus which has the exoergic member which generates heat by supply of power, and has at least the auxiliary power which can be charged as an electric power supply means to supply power to this exoergic member.

[0054] In heating apparatus according to claim 20, said auxiliary power of invention concerning claim 21 is an electric double layer capacitor.

[0055] In heating apparatus according to claim 20 or 21, as for invention concerning claim 22, the output voltage of said pressure-up means declines as the input voltage of said pressure-up means declines.

[0056] Invention concerning claim 23 has the control means which controls the output voltage of said pressure-up means in heating apparatus given in any 1 term of claims 20-22.

[0057] In heating apparatus according to claim 23, invention concerning claim 24 is controlled so that said control means becomes fixed in time about the output voltage of said pressure-up means.

[0058] Invention concerning claim 25 is set to heating apparatus according to claim 20. Said exoergic member The main exoergic member which generates heat by supplying power from the main power supply in which a steady electric power supply is possible, The power which has the auxiliary exoergic member which generates heat by supplying power through said pressure-up means from said auxiliary power, and is supplied to said auxiliary exoergic member through said pressure-up means from said auxiliary power is larger than the power supplied to said main exoergic member from said main power supply.

[0059] The main exoergic member which generates heat by supplying power from the main power supply in which the steady electric power supply of invention concerning claim 26 is possible, The auxiliary power which can be charged, and the pressure-up means which carries out the pressure up of the output voltage of this auxiliary power, In the heating apparatus which has the auxiliary exoergic member which generates heat by supplying power from this pressure-up means, and the heating component heated by said main exoergic member and said auxiliary exoergic member It has a detection means to detect the information about said auxiliary power, and the output voltage of said pressure-up means is controlled according to the detection information from this detection means.

[0060] In heating apparatus according to claim 26, said auxiliary power of invention concerning claim 27 is an electric double layer capacitor.

[0061] Invention concerning claim 28 is a temperature detection means by which said detection means detects the temperature of said heating component, in heating apparatus according to claim 26 or 27.

[0062] In heating apparatus according to claim 28, invention concerning claim 29 reduces said output voltage rather than the 1st electrical potential difference, when the detection temperature of said temperature detection means is higher than predetermined temperature.

[0063] In heating apparatus according to claim 28, invention concerning claim 30 changes said output voltage lower than the 1st electrical potential difference, when the detection temperature of said temperature detection means is higher than predetermined temperature.

[0064] In heating apparatus according to claim 28, invention concerning claim 31 has a remaining electricity ability detection means to detect the remaining electricity ability of said auxiliary power, and changes said output voltage according to the detection result of this remaining electricity ability detection means.

[0065] In heating apparatus according to claim 31, invention concerning claim 32 makes said output voltage lower than the 2nd electrical potential difference, when the remaining electricity ability of said auxiliary power detected with said remaining electricity ability detection means is higher than a predetermined value.

[0066] Invention concerning claim 33 equips any 1 term of claims 1-32 with the heating apparatus of a publication as said fixing means in the anchorage device which has the fixing means to which the non-established object on a heated object is fixed.

[0067] Invention concerning claim 34 equips any 1 term of claims 1-32 with the heating apparatus of a publication as said image heating means in the image formation equipment which has an image formation means to form an image on a record medium, and an image heating means to heat the image on said record medium.

[0068] Invention concerning claim 35 equips any 1 term of claims 1-32 with the heating apparatus of a publication



as said fixing means in the image formation equipment which has an image formation means to form a non-established image on a record medium, and the fixing means which heats the non-established image on said record medium, and is fixed to said record medium.

[0069]

[Embodiment of the Invention] Drawing 7 shows the outline of the operation gestalt 1 of this invention. This operation gestalt 1 is 1 operation gestalt of the image formation equipment of the electrophotography method which has an anchorage device. The photo conductor 1 of a drum configuration is used and the rotation drive of the image support which consists of body of revolution is carried out by the mechanical component which is not illustrated. Around this photo conductor 1, to the hand of cut shown by the arrow head, one by one As the electrification equipment 2 as an electrification means, the mirror 3 which constitutes a part of exposure means, and a development means A developer 4, the imprint equipment 5 as an imprint means to imprint the non-established toner image on a photo conductor 1 to the transfer paper P as a record medium which is a sheet-like heated object (for OHP paper etc. to be sufficient), the cleaning equipment 6 as a cleaning means, etc. are arranged.

[0070] Here, electrification equipment 2 consists of an electrification roller here, and a developer 4 becomes from the developer which has developing-roller 4a. Cleaning equipment 6 has blade 6a which \*\*\*\*s to the peripheral face of a photo conductor 1. A photo conductor 1 calls the location where it is scanned with the exposure light Lb through a mirror 3 by the exposure means between electrification equipment 2 and developing-roller 4a, and the exposure light Lb on a photo conductor 1 is irradiated the exposure section 7. Imprint equipment 5 has countered with the inferior surface of tongue of a photo conductor 1, and calls the imprint equipment 5 on a photo conductor 1, and the location which counters the imprint section 8.

[0071] The resist roller 9 of a pair is formed in the location of the transfer paper conveyance direction upstream from the imprint section 8, and a transfer paper P is sent out by the feed koro 10 from the medium tray which is not illustrated towards this resist roller 9. This transfer paper P is guided with the conveyance guide which is not illustrated, and stops with the resist roller 9. The anchorage device 12 as heating apparatus which has a heating roller 11 is arranged from the imprint section 8 in the location of the transfer paper conveyance direction downstream.

[0072] In this image formation equipment, image formation is performed as follows. At the time of use, a photo conductor 1 begins rotation, a photo conductor 1 is charged in homogeneity with electrification equipment 2 in in the dark during rotation of this photo conductor 1, and the electrostatic latent image corresponding to the image which should be formed is formed by the exposure light's Lb being irradiated by the exposure section 7 of a photo conductor 1 through a mirror 3 with an exposure means, and scanning a photo conductor 1. The electrostatic latent image on this photo conductor 1 moves to the place of a developer 4 by rotation of a photo conductor 1, a visible image is formed by the developer 4 with a toner here, and a toner image is formed.

[0073] On the other hand, feed of a transfer paper P is started by the feed koro 10 from a medium tray, and this transfer paper P waits for the timing of a send which stops through the conveyance path shown with a broken line in the location of the resist roller 9 of a pair, and agrees in the toner image and the imprint section 8 on a photo conductor 1. If the timing of this send comes, the transfer paper P which had stopped in the location of the resist roller 9 will be sent out with the resist roller 9, and will be conveyed towards the imprint section 8.

[0074] The toner image and transfer paper P on a photo conductor 1 agree in the imprint section 8, and the toner image on a photo conductor 1 is imprinted by the transfer paper P by the electric field by imprint equipment 5. Therefore, a photo conductor 1, electrification equipment 2, an exposure means, the development means 4, and imprint equipment 5 constitute an image formation means to form the non-established image which consists of a non-established toner image on a transfer paper P. A transfer paper P supports the imprinted toner image, and is conveyed towards an anchorage device 12. While passing an anchorage device 12, it is fixed to a toner image, and this transfer paper P is delivered to the delivery unit which is not illustrated. Moreover, while resulting in cleaning equipment 6 with rotation of a photo conductor 1 and passing this cleaning equipment 6, the residual toner which remained on the photo conductor 1, without imprinting in the imprint section 8 is cleaned by blade 6a, and the next image formation is equipped with it.

[0075] Drawing 8 shows the detailed configuration of the above-mentioned anchorage device 12. An anchorage device 12 has the fixing roller 11 as a heating unit, and the pressurization roller 13 as a pressurization member by which a pressure welding is carried out to this fixing roller 11. The rotation drive of a fixing roller 11 and the pressurization roller 13 is carried out by the mechanical component which is not illustrated, a fixing roller 11 is heated by generation of heat of main exoergic member 11a and auxiliary exoergic member 11b, and temperature goes up it. Although the halogen heater is used, these exoergic members (it is also called a heating element) 11a and 11b are not restricted to especially a halogen heater, in addition exoergic members, such as a resistance heating element, may be used for them. While the transfer paper P which supports the non-established toner image t passes

the nip section of a fixing roller 11 and the pressurization roller 13, heating and pressurization with a fixing roller 11 and the pressurization roller 13 are fixed to the toner image t.

[0076] Drawing 1 and drawing 2 show the circuitry of the above-mentioned anchorage device 12. In drawing 1 and drawing 2, they are the energization control switches to which the switch as a charge-and-discharge change means by which in 14 auxiliary power and 16 change a battery charger and, as for 17, a main power supply and 15 change the charge and discharge of auxiliary power 15, the temperature sensor as a temperature detection means by which 18 detects the temperature (skin temperature) of a fixing roller 11, and 19 perform a configuration change means, and 20 performs energization control of exoergic member 11a. The fixing roller 11 as a heating unit has the exoergic members 11a and 11b inside, and exoergic member 11a generates heat with the power supplied through the energization control switches 20 from a main power supply 14, and heats a fixing roller 11.

[0077] A main power supply 14 may output the alternating current power from a source power supply by connecting with the plug socket with which the installation of the image formation equipment concerned is equipped, and may have the function to perform rectification to the direct current from adjustment and an alternating current of the electrical potential difference according to a fixing roller 11 etc. Auxiliary power 15 is equipment in which charge and discharge are possible, and the electric double layer capacitor which is a mass capacitor is used for it with this operation gestalt. A capacitor has the following outstanding description (1) and following outstanding (2) in order not to accompany it by the chemical reaction unlike a rechargeable battery.

(1) The charging time is short. : Even if it performs boosting charge, in order for charge to take several hours time amount by the auxiliary power using the common nickel-cadmium battery as a rechargeable battery, every several hours, the count of large electric power supply possible of a day could be realized only several times, and was not practical. On the other hand, in the auxiliary power using a capacitor, since the rapid charge for dozens of seconds - about several minutes is possible, the count of heating using auxiliary power can be increased even to a practical count. For this reason, when a capacitor is used as auxiliary power like this operation gestalt, compared with the case where a common nickel-cadmium battery is used as auxiliary power, the count of heating of the fixing roller using the auxiliary power within the same time amount increases.

(2) A life is long. : Since the count of a repeat of charge and discharge is 500 to 1000 times, as auxiliary power for heating, the life of a nickel-cadmium battery is short, and the time and effort and cost of exchange pose a problem. On the other hand, the auxiliary power using a capacitor has 10,000 times or more of almost eternal lives, and there is also little degradation by the charge and discharge of a repeat. Therefore, it is advantageous to especially heating apparatus and image formation equipment that repeat non-heating actuation (standby) and heating actuation. Moreover, since neither liquid exchange nor a supplement is needed like a lead accumulator, a maintenance is hardly needed.

(3) Safety is high. : A rechargeable battery has the risk of a container expanding by the gas by the chemical reaction etc., and exploding, when there is no need for discharge and it continues connecting with a charge circuit, after charging to maximum capacity since the chemical reaction is used. On the other hand, since the auxiliary power using a capacitor uses not a chemical reaction but physical development, generating of gas etc. is [ nothing ] and is safe for it.

[0078] In recent years, the thing which has a lot of electrical energy stored also in a capacitor is developed, and the adoption to the electric vehicle of a capacitor etc. is also considered. For example, the electric double layer capacitor which NIPPON CHEMI-CON CORP. developed has about [ 2000F ] electrostatic capacity, and is equipped with sufficient capacity for the electric power supply for several seconds to dozens of seconds. Moreover, the about [ 80F ] capacitor is realized by the trade name of a hyper-capacitor, and the thing for about dozens of seconds to do for the time amount supply of the about [ 10A ] current is possible for this capacitor in NEC.

[0079] While power is supplied to exoergic member 11a through the energization control switches 20 with this operation gestalt from a main power supply 14 about the electric power supply to the exoergic members 11a and 11b of a fixing roller 11, it is possible to supply power from auxiliary power 15 through a switch 17 also to exoergic member 11b. Thereby, a lot of power with which between the short predetermined time for several seconds to about dozens of seconds exceeds the maximum supply voltage by the main power supply 14 can be supplied to a fixing roller 11 by using the power from both a main power supply 14 and the auxiliary power 15 for heating of a fixing roller 11.

[0080] When the auxiliary power 15 which consists of a capacitor is not fully charged, a switch 17 is changed to a battery-charger 16 side by the control means which is not illustrated at the time of the standby which does not consume power comparatively etc., and auxiliary power 15 is charged by a battery charger's 16 changing the alternating current power from a main power supply 14 into direct current power, and being impressed by auxiliary power 15 through a switch 17. It starts, and when [ at which the fixing rollers 11, such as the time, need a lot of power ] the temperature of a fixing roller 11 wants to rise rapidly from a room temperature to operating temperature

(temperature which can be established), a switch 17 is changed to the exoergic member 11b side by the control means, and power is supplied to exoergic member 11b through a switch 17 from auxiliary power 15.

[0081] When [ both ] a fixing roller 11 needs a lot of power by this, with a rechargeable battery, the effectiveness which was not acquired can be acquired by could raise the temperature of a fixing roller 11 for a short time by supplying a lot of energy to the exoergic members 11a and 11b of a fixing roller 11 using the power from a main power supply 14 and auxiliary power 15, and having used the capacitor as auxiliary power 15.

[0082] Although the control means which is not illustrated makes the energization control switches 20 turn on and makes power supply to exoergic member 11a of a fixing roller 11 from a main power supply 14 based on the detection signal from a temperature sensor 18 when it is below the laying temperature to which the skin temperature of a fixing roller 11 can be fixed The skin temperature of a fixing roller 11 is controlled by making the energization control switches 20 turn off and making the electric power supply from a main power supply 14 to exoergic member 11a of a fixing roller 11 turn off, when the laying temperature to which the skin temperature of a fixing roller 11 can be fixed is exceeded to fixed temperature.

[0083] It is possible to change how to connect two or more of these capacitor cels 15a and 15b with this operation gestalt by auxiliary power 15 consisting of at least two or more capacitor cels 15a and 15b at the time of an electric power supply. Moreover, the configuration of the auxiliary power 15 which consists of two or more capacitor cels 15a and 15b can be changed at least at the time of discharge. Based on the detection signal from a temperature sensor 18, the configuration change means 19 is changed so that the supply voltage to the exoergic members 11a and 11b may become low, as the temperature of a fixing roller 11 becomes high.

[0084] For example, as shown in drawing 1 , the configuration change means 19 connects the capacitor cels 15a and 15b with a serial, makes the high voltage applied voltage to exoergic member 11b, and it makes large power supply to exoergic member 11b in the condition like [ at the time of initial heating with which the temperature of a fixing roller 11 does not reach low predetermined temperature ].

[0085] Then, when the temperature of a fixing roller 11 becomes high and becomes beyond predetermined temperature, as shown in drawing 2 , the configuration change means 19 connects the capacitor cels 15a and 15b with juxtaposition, as shown in drawing 4 , lowers the applied voltage to exoergic member 11b, and makes small the electric power supply to exoergic member 11b. Thereby, since the temperature change of a fixing roller 11 becomes loose also as for ON / off control of the electric power supply from a main power supply 14 and the auxiliary power 15 to the exoergic members 11a and 11b of a fixing roller 11, the heating nonuniformity of the image which time temperature fluctuation of a fixing roller 11 formed on the transfer paper P by becoming small becomes small, and quality image formation becomes possible.

[0086] The capacitor cels 15a and 15b tie. In addition, as a direction Although you may make it connect only a part of capacitor cel 15a with exoergic member 11b through a switch 17 as are shown in drawing 1 , and the capacitor cels 15a and 15b are shown in drawing 3 , without tying to a serial the energy which can be supplied to exoergic member 11b is a part of maintenance energy of auxiliary power 15 -- and Since it is hard to balance capacitor cel 15a at the time of charge, and 15b, it is desirable to connect the capacitor cels 15a and 15b with a serial, and to supply power to exoergic member 11b, as shown in drawing 1 .

[0087] The fixing roller 11 as a heating unit which temperature goes up by generation of heat of the exoergic members 11a and 11b according to this operation gestalt 1, The main power supply 14 which a source power supply is used and supplies power to exoergic member 11a, In the heating apparatus which has the mass capacitor which consists of two or more cels 15a and 15b used as auxiliary power 15 which is charged from a source power supply and supplies power to exoergic member 11b Since it considered as the configuration which carries out adjustable [ of the connection of two or more cels 15a and 15b ] at least at the time of discharge, generating of the temperature nonuniformity of a heating unit can be reduced by supplying power to exoergic member 11b by the low battery. That is, although the temperature nonuniformity of a heating unit will become large if large power is supplied by the high voltage when the temperature of a heating unit is low, by supplying power to an exoergic member by the low battery, generating of the temperature nonuniformity of a heating unit can be reduced and temperature fluctuation of a heating unit can be made small.

[0088] Moreover, since it considered as the configuration which changes two or more cels 15a and 15b juxtaposition and a serial according to the operation gestalt 1, as many maintenance energy of a capacitor as possible can be used.

[0089] Moreover, since according to the operation gestalt 1 it has a detection means (temperature sensor 18) to detect the situation of the equipment concerned and connection of two or more cels 15a and 15b is changed using the detection information on this detection means, temperature fluctuation can be made small and build up time can be shortened.

[0090] Moreover, since the temperature sensor 18 as a temperature detection means to detect the temperature of a

heating unit 11 as the above-mentioned detection means was used according to the operation gestalt 1, temperature fluctuation can be made small and build up time can be shortened.

[0091] Moreover, since according to the operation gestalt 1 two or more cels 15a and 15b are connected to juxtaposition and power is supplied to a heating unit 11 from these two or more cels 15a and 15b when a heating unit 11 is beyond predetermined temperature, temperature fluctuation of a heating unit can be made small.

[0092] Moreover, since according to the operation gestalt 1 two or more cels 15a and 15b are connected to a serial and power is supplied to a heating unit 11 from these cels 15a and 15b when a heating unit 11 does not reach predetermined temperature, a temperature rise can be made quick and temperature fluctuation can be made small.

[0093] Drawing 5 shows each connection condition of the capacitor cel in the operation gestalt 2 of this invention.

With this operation gestalt 2, the mass electric double layer capacitor with which auxiliary power 15 consists of two or more capacitor cels 15a-15f is used in the above-mentioned operation gestalt 1. If the electrical potential difference of one capacitor cel is set to V, as shown in drawing 5 (a), when every three capacitor cels 15a-15c and the thing which connected 15d-5f to the serial, respectively are connected to juxtaposition, the output voltage of auxiliary power 15 will be set to 3V.

[0094] Moreover, as shown in drawing 5 (b), when what connected every two capacitor cels 15a, 15b, 15c, 15d, 15e, and 5f to the serial, respectively is connected to juxtaposition, the output voltage of auxiliary power 15 is set to 2V, and as shown in drawing 5 (c), when each capacitor cels 15a-5f are connected to juxtaposition, the output voltage of auxiliary power 15 is set to 1V.

[0095] The configuration change means 19 changes capacitor cels [ 15a-5f ] how to tie according to the temperature of a fixing roller 11 based on the detection signal from a temperature sensor 18. In addition, the configuration change means 19 is also good to change capacitor cels [ 15a-15f ] how to tie to no configurations of drawing 5 (a) - drawing 5 (c), for example, to change to the configuration of drawing 5 (a) and (b).

[0096] There is a minimum exoergic electrical potential difference which stops generating heat when a supply voltage is low to remainder in the exoergic members 11a and 11b. For this reason, if the number of trains of parallel connection and the number of series connection are simply changed as shown in drawing 1 and drawing 2 , the exoergic members 11a and 11b may not generate heat capacitor cels [ 15a-5f ] how to tie at the time of a low electric power supply. In this case, the configuration change means 19 is based on a detection signal from a temperature sensor 18. The temperature of a fixing roller 11 is embraced (by whether the temperature of a fixing roller 11 reached predetermined temperature). Capacitor cels [ 15a-5f ] how to tie is changed to the configuration of drawing 5 (a), and the configuration of drawing 5 (b) (when the temperature of a fixing roller 11 does not reach predetermined temperature, capacitor cels [ 15a-5f ] how to tie is changed to the configuration of drawing 5 (a)). When the temperature of a fixing roller 11 becomes beyond predetermined temperature, capacitor cels [ 15a-5f ] how to tie is changed to the configuration of drawing 5 (b). Exoergic member 11a, The image formation equipment which can make small nonuniformity of the temperature change of a fixing roller 11 is realized by making output voltage to 11b into a little higher electrical potential difference (electrical potential difference with a small change) called 3V and 2V, making the exoergic members 11a and 11b generate heat.

[0097] Since it considered as the configuration which makes adjustable the number of trains of two or more cels [ 15a-5f ] parallel connection, and carries out adjustable [ of the connection of two or more cels 15a-5f ] according to this operation gestalt 2, temperature fluctuation of a heating unit can be made small.

[0098] Drawing 6 shows the circuitry of the anchorage device in the operation gestalt 3 of this invention. Although the control section of the image formation equipment concerned carries out counting of the continuation image formation number of sheets and that continuation image formation number-of-sheets information is held in the above-mentioned operation gestalt 1 with this operation gestalt 3, this continuation image formation number-of-sheets information is sent to the configuration change means 19. The continuation image formation number-of-sheets information from the above-mentioned control section is inputted instead of the detection information from a temperature sensor 18, and the configuration change means 19 changes how to connect the capacitor cels 15a and 15b according to continuation image formation number-of-sheets information, and controls appropriately the supply voltage to the exoergic members 11a and 11b.

[0099] That is, in order to fall as continuation image formation number of sheets of temperature of a fixing roller 11 increases, the configuration change means 19 changes how to connect the capacitor cels 15a and 15b so that the supply voltage to exoergic member 11b may become high as continuation image formation number of sheets increases. For example, when how to connect the capacitor cels 15a and 15b when continuation image formation number of sheets does not reach predetermined number of sheets is changed as shown in drawing 2 , and continuation image formation number of sheets becomes about it more than predetermined number of sheets, the configuration change means 19 changes how to connect the capacitor cels 15a and 15b, as shown in drawing 1 .

[0100] Since how to connect a capacitor cel using the continuation heating number-of-sheets information on the

transfer paper which is a heated object (here continuation image formation number-of-sheets information) is changed according to this operation gestalt 3, temperature fluctuation of a heating unit can be made small.

[0101] Moreover, an image formation means to form an image on the transfer paper P as a heated object according to the operation gestalt 1 thru/or the operation gestalt 3 (a photo conductor 1, electrification equipment 2, an exposure means, the development means 4, imprint equipment 5), In the image formation equipment which has an image heating means to heat the image on a transfer paper P, since it had the above-mentioned heating apparatus 12 as said image heating means, the nonuniformity of an image can be lost and output quality can be made high.

[0102] Moreover, an image formation means to form a non-established image on the transfer paper P as a heated object according to the operation gestalt 1 thru/or the operation gestalt 3 (a photo conductor 1, electrification equipment 2, an exposure means, the development means 4, imprint equipment 5), In the image formation equipment which has the fixing means which heats the non-established image on a transfer paper P, and is fixed to a transfer paper P, since it had the above-mentioned anchorage device 12 as a fixing means, the nonuniformity of an image can be lost and output quality can be made high.

[0103] Drawing 9 shows the heating apparatus in the operation gestalt 4 of this invention. In the above-mentioned operation gestalt 1, a fixing roller 21 is used instead of a fixing roller 11, an elastic layer and a mold release layer are formed one by one on rodding, and this fixing roller 21 is constituted from this operation gestalt 4 by the three-tiered structure. Drawing 10 shows the circuitry of the anchorage device 12 in the operation gestalt 4. The control section 22 as a control means which controls the energization to exoergic member 14a from a main power supply 14 Consist of control units, such as CPU, and it is based on a detection signal from a temperature sensor 18. the energization control switches 20 -- reaching -- Although the energization control switches 20 are made to turn on and power is made to supply to exoergic member 11a of a fixing roller 21 from a main power supply 14 when the skin temperature of a fixing roller 21 is below laying temperature The skin temperature of a fixing roller 21 is controlled by making the energization control switches 20 turn off and making the electric power supply from a main power supply 14 to exoergic member 11a of a fixing roller 21 turn off, when the skin temperature of a fixing roller 21 exceeds laying temperature to fixed temperature.

[0104] The charge-and-discharge change section 23 as a charge-and-discharge change means which changes the charge and discharge of auxiliary power 15 changes a switch 17 to a battery-charger 16 side at the time of the standby which does not consume power comparatively when auxiliary power 15 is not fully charged etc., and a battery charger 16 charges auxiliary power 15 through a switch 17. Moreover, it starts, and when [ at which the fixing rollers 21 such as the time, need a lot of power ] the temperature of a fixing roller 21 wants to rise rapidly from a room temperature to operating temperature (temperature which can be established), the charge-and-discharge change section 23 changes a switch 17 to the exoergic member 11b side, and makes power supply to exoergic member 11b through a switch 17 from auxiliary power 15.

[0105] With this operation gestalt 4, by having covered the elastic layer to rodding of a fixing roller 21, adhesion of a fixing roller 21 and the toner layer on a transfer paper P can be made high by the elasticity of this elastic layer, and the outstanding image quality without gloss nonuniformity can be acquired. Moreover, according to the thermal conductivity of the elastic layer of a fixing roller 21 being bad, only by the electric power supply from a main power supply 14 to exoergic member 11a, even when depression of the skin temperature of a fixing roller 21 arises at the time of continuation \*\*\*\*, it can keep image fixable good by supplying power to exoergic member 11b from auxiliary power 15, without reducing a process rate.

[0106] As rodding of a fixing roller 21, the thermally conductive high metal of iron, aluminum, stainless steel, etc. can be used. Silicone rubber, a fluororubber, etc. can be mentioned that what is necessary is just a heat-resistant high elastic body as an elastic layer of a fixing roller 21. Also especially in this, the point of thermal resistance and endurance to silicone rubber is desirable as an elastic layer of a fixing roller 21. Although based also on the rubber degree of hardness of the ingredient to be used as thickness of the elastic layer of a fixing roller 21, about 0.1-1mm is desirable. When the thickness of the elastic layer of a fixing roller 21 is thinner than 0.1mm, irregularity of a toner layer or a transfer paper cannot be absorbed, and a poor image, such as gloss nonuniformity, arises. Moreover, since the heat capacity of a fixing roller 21 becomes large, it will start and the time amount at the time will become long if the elastic layer of a fixing roller 21 is thicker than 1mm, it is not desirable.

[0107] The resin which has thermal resistance is used as a mold release layer of a fixing roller 21, for example, a fluororesin, silicone resin, etc. are mentioned. If a mold-release characteristic and endurance are taken into consideration, especially the mold release layer of a fixing roller 21 has a desirable fluororesin, and fluororesins, such as PFA (perfluoroalkyl vinyl ether copolymerization resin), PTFE (PORITE trough fluoro ethylene), and FEP (tetrafluoroethylene 6 fluoride [ propylene ] copolymerization resin), can be used for it.

[0108] As thickness of the mold release layer of a fixing roller 21, it is 5-30 micrometers preferably. The endurance of a mold release layer may become it low that the thickness of the mold release layer of a fixing roller 21 is less

than 5 micrometers, when the thickness of the mold release layer of a fixing roller 21 exceeds 30 micrometers, a mold release layer may become hard, poor image quality, such as gloss nonuniformity, may appear, and it is not [ both ] desirable. the mold release layer of a fixing roller 21 -- not necessarily -- the need -- if -- although there is nothing, since the separability of a fixing roller and the toner on a transfer paper improves when there is a mold release layer of a fixing roller 21, as for a fixing roller 21, it is desirable to have a mold release layer.

[0109] Thus, with the operation gestalt 4, in the above-mentioned operation gestalt 1, since the fixing roller 21 as a heating unit has an elastic layer, high-definition-izing and improvement in the speed can be reconciled. Moreover, with the operation gestalt 4, since the thickness of an elastic layer is 0.1mm or more, high definition is securable. Furthermore, with the operation gestalt 4, since the mold release layer was prepared in the outermost layer of an elastic layer, the separability of a heating unit and a toner image can be raised.

[0110] By the way, with the above-mentioned operation gestalt 4, if the skin temperature of a fixing roller 21 turns into below predetermined temperature, heat cannot fully be given to the toner on a transfer paper P from a fixing roller 21, but poor \*\*\*\* will arise. The operation gestalt 5 of this invention is set in the above-mentioned operation gestalt 4. Then, the charge-and-discharge change section 23 It judges whether based on the detection signal from a temperature sensor 18, the skin temperature of a fixing roller 21 turned into below predetermined temperature at the time of continuation \*\*\*\* (at the time of continuation image formation). When the skin temperature of a fixing roller 21 turns into below predetermined temperature, change a switch 17 to the exoergic member 11b side, power is made to supply to exoergic member 11b through a switch 17 from auxiliary power 15, and the skin temperature of a fixing roller 21 is held to the temperature requirement which poor \*\*\*\* does not produce. The charge-and-discharge change section 23 changes a switch 17 to a battery-charger 16 side at the time of the standby which does not consume power comparatively when auxiliary power 15 is not fully charged etc., and the battery charger 16 charges auxiliary power 15 through the switch 17:

[0111] As shown in drawing 4, it is tended sharply to change the skin temperature of a fixing roller 21 in time, in order to supply large power to exoergic member 11b at a stretch from auxiliary power 15, in case the auxiliary power 15 using a mass capacitor is used turning on / turning off the electric power supply from a main power supply 14 to exoergic member 11a by the energization control switches 20 like this operation gestalt 5, and controlling the skin temperature of a fixing roller 21.

[0112] the supply voltage to the heating components 11a and 11b for heating a fixing roller 21 only by the supply voltage of a main power supply 14 supplies large power to the midst which is performing continuous heating actuation with the anchorage device 12 rapidly from auxiliary power 15 to heating component 11b, when slightly inadequate -- the skin temperature of a fixing roller 21 -- a connoisseur -- by changing to Kaminaka, nonuniformity is made to image quality and there is fault of reducing image quality.

[0113] Then, the configuration change means 19 changes how to connect two or more capacitor cels 15a and 15b, and adjusts the amount of supply voltages from auxiliary power 15 to heating component 11b. for example, in the condition like [ at the time of initial heating with which the skin temperature of a fixing roller 21 is checked based on the detection signal from a temperature sensor 18, and the temperature of a fixing roller 21 does not reach predetermined temperature ] As shown in drawing 1  $R > 1$ , the capacitor cels 15a and 15b are connected with a serial, applied voltage to exoergic member 11b is made into the high voltage, and large power is made to supply to exoergic member 11b.

[0114] Then, when the skin temperature of a fixing roller 21 becomes beyond predetermined temperature at the time of continuation \*\*\*\* (at the time of continuation image formation) and supplies power to heating component 11b from auxiliary power 15 at it, as shown in drawing 2, the configuration change means 19 connects two or more capacitor cels 15a and 15b with juxtaposition, lowers the applied voltage to exoergic member 11b, and makes small the supply voltage over exoergic member 11b.

[0115] Thus, with the operation gestalt 5, auxiliary power 15 can change how to connect two or more capacitor cels 15a and 15b into parallel connection at least at the time of discharge. Like [ at the time of the fall of the skin temperature of the fixing roller 21 at the time of continuation \*\*\*\* (at the time of continuation image formation) ], when the skin temperature of a fixing roller 21 is to some extent high, by connecting two or more capacitor cels 15a and 15b to juxtaposition, the applied voltage to exoergic member 11b can be lowered, and the supply voltage over exoergic member 11b can be made small. Thereby, even if it turns on/controls [ off ] the supply voltage from auxiliary power 15 to heating component 11b, change of the skin temperature of a fixing roller 21 becomes loose, a time change of the skin temperature of a fixing roller 21 becomes small, the heating nonuniformity by the anchorage device 12 of an image becomes small, and quality image formation becomes possible.

[0116] With this operation gestalt 5, since power is supplied to exoergic member 11b from auxiliary power 15 when the skin temperature of the fixing roller 21 as a heating unit turns into below predetermined temperature at the time of continuation \*\*\*\* to which the transfer paper P which is a heated object passes an anchorage device 12



continuously (at the time of continuation image formation), temperature depression of the heating unit at the time of continuation \*\*\*\* (at the time of continuation image formation) can be prevented, and improvement in the speed can be attained.

[0117] Moreover, with the operation gestalt 5, since auxiliary power 15 was equipped with two or more capacitor cels 15a and 15b and the connection was made adjustable, the amount of supply voltages from auxiliary power 15 to exoergic member 11b can be optimized. Moreover, with the operation gestalt 5, since the capacitor cels 15a and 15b are connected to juxtaposition at the time of discharge of auxiliary power 15, the stability of the temperature of the fixing roller 21 as a heating unit can be raised.

[0118] The amount of skin temperature falls of a fixing roller 21 is mostly decided by continuation \*\*\*\* number of sheets (continuation image formation number of sheets), although it is dependent on the class of transfer paper P. With the operation gestalt 6 of this invention, it sets in the above-mentioned operation gestalt 4. Then, the charge-and-discharge change section 23 It judges whether based on the information on the continuation image formation number of sheets which carried out counting, continuation image formation number of sheets became more than predetermined number of sheets in the control section of the image formation equipment concerned at the time of continuation \*\*\*\* (at the time of continuation image formation). When continuation image formation number of sheets becomes more than predetermined number of sheets Change a switch 17 to the exoergic member 11b side, and power is made to supply to exoergic member 11b through a switch 17 from auxiliary power 15, and by holding the skin temperature of a fixing roller 21 to the temperature requirement which poor fixing does not produce, even if it does not reduce a rate, it keeps fixable good. Here, predetermined number of sheets is decided according to the configuration (especially heat capacity, heat conductivity) of the injection power from a main power supply 14, and a fixing roller 21, a process, conveyance spacing (distance) of a transfer paper, the class of transfer paper, etc. The charge-and-discharge change section 23 changes a switch 17 to a battery-charger 16 side at the time of the standby which does not consume power comparatively when auxiliary power 15 is not fully charged etc., and the battery charger 16 charges auxiliary power 15 through the switch 17.

[0119] Moreover, the charge-and-discharge change section 23 changes how to connect two or more capacitor cels 15a and 15b, and adjusts the amount of supply voltages from auxiliary power 15 to heating component 11b. for example, in the condition like [ at the time of initial heating with which the skin temperature of a fixing roller 21 is checked based on the detection signal from a temperature sensor 18, and the temperature of a fixing roller 21 does not reach predetermined temperature ] As shown in drawing 1 , the capacitor cels 15a and 15b are connected with a serial, applied voltage to exoergic member 11b is made into the high voltage, and large power is made to supply to exoergic member 11b.

[0120] Then, when the skin temperature of a fixing roller 21 becomes beyond predetermined temperature at the time of continuation \*\*\*\* (at the time of continuation image formation) and supplies power to heating component 11b from auxiliary power 15 at it, as shown in drawing 2 , the charge-and-discharge change section 23 connects two or more capacitor cels 15a and 15b with juxtaposition, lowers the applied voltage to exoergic member 11b, and makes small the electric power supply to exoergic member 11b.

[0121] With this operation gestalt 6, since power is supplied to exoergic member 11b from auxiliary power 15 when the number of sheets (continuation image formation number of sheets) in which the transfer paper P which is a heated object passes an anchorage device 12 continuously turns into predetermined number of sheets, temperature depression of the heating unit at the time of continuation \*\*\*\* (at the time of continuation image formation) can be prevented, and improvement in the speed can be attained.

[0122] In the above-mentioned operation gestalt 2, the heating roller 21 in the above-mentioned operation gestalt 4 is used for the operation gestalt 7 of this invention instead of a fixing roller 11. According to this operation gestalt 7, at the time of discharge, since two or more capacitor cels 15a-5f of auxiliary power 15 are connected so that the applied voltage of exoergic member 11b may become more than the minimum exoergic electrical potential difference of exoergic member 11b, the applied voltage of exoergic member 11b can secure the minimum exoergic electrical potential difference of exoergic member 11b, and exoergic member 11b can be made to generate heat certainly at least. In the above-mentioned operation gestalt 3, the heating roller 21 in the above-mentioned operation gestalt 4 is used for the operation gestalt 8 of this invention instead of a fixing roller 11, and the same effectiveness as the operation gestalt 4 is acquired.

[0123] Next, the example 1 of this invention is explained. In the above-mentioned operation gestalt 4, the fixing roller 21 prepared and constituted the PFA layer with a thickness of 30 micrometers from this example 1, in order to form silicone rubber in 0.5mm in thickness as an elastic layer and to raise a surface mold-release characteristic to iron bell shape rodding with an outer diameter [ of 40mm ], and a thickness of 1mm on it. An outer diameter is 40mm and the pressurization roller 13 prepared the elastic layer of silicone rubber with a thickness of 3mm in the periphery of rodding made from aluminum. The spring was used for this pressurization roller 13 in the direction of

a revolving shaft of a fixing roller 21, the load was applied, and the width of face of the nip section with a fixing roller 21 was about 8mm. In exoergic member 11a, exoergic member 11b used the space heater of 500W using the main heater of 900W. Since the skin temperature of a fixing roller 21 fell gradually when the fixing roller 21 was heated only by main heater 11a and continuation \*\*\*\* was performed to the anchorage device 12, the electric power supply from auxiliary power 15 to space heater 11b was performed in the place to which the skin temperature of a fixing roller 21 fell to 165 degrees C. Consequently, the skin temperature of a fixing roller 21 was able to keep fixable good, without recovering and reducing linear velocity.

[0124] Next, the example 1 of a comparison is explained. In the example 1, the example 1 of a comparison was the thing it was made not to use auxiliary power 15, the skin temperature of a fixing roller 21 fell to 160 degrees C or less by continuation \*\*\*\*, and poor fixing produced it. Linear velocity had to be reduced in order to maintain the skin temperature of a fixing roller 21 at the temperature which poor fixing does not produce.

[0125] Next, the example 2 of this invention is explained. In the operation gestalt 7, the example 2 of a fixing roller 21 and the exoergic members 11a and 11b was the same as an example 1, as shown in drawing 5 (b), it connected two or more capacitor cels 15a-5f, and it performed the electric power supply to space heater 11b. since the skin temperature of a fixing roller 21 fell gradually when the fixing roller 21 was heated only by main heater 11a and continuation \*\*\*\* was performed to the anchorage device 12 -- an anchorage device 12 -- a 130-sheet copy -- the electric power supply from auxiliary power 15 to space heater 11b was performed in the place which carried out paper. Consequently, the skin temperature of a fixing roller 21 was able to keep fixable good, without recovering gently and reducing linear velocity.

[0126] Next, the example 2 of a comparison is explained. In the example 2, the example 2 of a comparison is the thing it was made not to use auxiliary power 15, and poor fixing produced it in the 135th sheet in continuation \*\*\*\*. Next, the example 3 of a comparison is explained. In the example 2, the example 3 of a comparison connected two or more capacitor cels 15a-5f, as shown in drawing 5 R> 5 (c), and it performed the electric power supply to space heater 11b. In this example 3 of a comparison, the applied voltage of space heater 11b became below the minimum exoergic electrical potential difference of space heater 11b, it did not generate heat, but the skin temperature of a fixing roller 21 fell further by continuation \*\*\*\* to an anchorage device 12, and poor fixing produced space heater 11b.

[0127] Next, an example 3 is explained. In the operation gestalt 7, the example 3 prepared and constituted the PFA layer with a thickness of 30 micrometers, in order that a fixing roller 21 might form silicone rubber in 0.3mm in thickness as an elastic layer and might raise a surface mold-release characteristic to bell shape rodding with an outer diameter [ of 40mm ], and a thickness of 3mm made from aluminum on it. An outer diameter is 40mm and the pressurization roller 13 prepared the elastic layer of silicone rubber with a thickness of 3mm in the periphery of rodding made from aluminum. The spring was used for this pressurization roller 13 in the direction of a revolving shaft of a fixing roller 21, the load was applied, and the width of face of the nip section with a fixing roller 21 was about 8mm. In exoergic member 11a, exoergic member 11b used the space heater of 500W using the main heater of 900W. Two or more capacitor cels 15a-5f were connected as shown in drawing 5 R> 5 (b), and they performed the electric power supply to space heater 11b. Since the skin temperature of a fixing roller 21 fell gradually when the fixing roller 21 was heated only by main heater 11a and continuation \*\*\*\* was performed to the anchorage device 12, the electric power supply from auxiliary power 15 to space heater 11b was performed in the place to which the skin temperature of a fixing roller 21 fell to 165 degrees C. Consequently, the skin temperature of a fixing roller 21 was able to keep fixable good, without recovering gently and reducing linear velocity. Moreover, the image after fixing had neither gloss nonuniformity nor ZARATSUKI, and its image quality was good.

[0128] Next, the operation gestalt 9 of this invention is explained. With this operation gestalt 9, the circuitry of an anchorage device shows the above-mentioned operation gestalt 1 to drawing 11 . In drawing 1111 , the main power supply which outputs the alternating current power from a source power supply by 24 being connected to the plug socket with which the installation of this operation gestalt is equipped, a charge-and-discharge change means by which auxiliary power and 26 change a battery charger and, as for 27, 25 changes the charge and discharge of auxiliary power 25, and 28 are principal voltage control means which control the electric power supply from a main power supply 24 to main exoergic member 11a.

[0129] From a main power supply 24, power is supplied through the principal voltage control means 28, and main exoergic member 11a generates heat. Auxiliary exoergic member 11b generates heat by supplying power from auxiliary power 25. By a battery charger's 26 changing the alternating current power from a main power supply 24 into direct current power, and being impressed by auxiliary power 25 through the charge-and-discharge change means 27, auxiliary power 25 is charged and power is supplied to auxiliary exoergic member 11b from auxiliary power 25 by changing the charge-and-discharge means for switching 27 from a battery-charger 26 side to the auxiliary exoergic member 11b side.



[0130] Thus, the simplification of a circuit and reduction of cost are possible by power being supplied from a main power supply 24 and auxiliary power 25 in another network to main exoergic member 11a and auxiliary exoergic member 11b. The anchorage device shown at drawing 13 for comparing the anchorage device of the example of a configuration and the anchorage device of this operation gestalt 9 which made this one line as shown in drawing 13 is a configuration which supplies the power from a main power supply 24 and auxiliary power 25 to one exoergic member 11c, and is changed into heat.

[0131] However, in this anchorage device, it is necessary to carry out A/D conversion of the power from a main power supply 24 in the A/D-conversion section 29, and to supply exoergic member 11c through the principal voltage control means 28 and a circuit changing switch 30, and power is supplied to exoergic member 11c through the charge-and-discharge change means 27 and a circuit changing switch 30 from auxiliary power 25. For this reason, while a configuration is complicated, cost goes up, and the technical problem that a supply voltage will decline with the conversion efficiency in the A/D-conversion section 29 occurs further. Therefore, two configurations of an anchorage device shown in drawing 11 are desirable.

[0132] In this operation gestalt 9, the fixing roller 11 which is a heating roller as a heating unit has the exoergic members 11a and 11b. The thin film resistor which formed the halogen heater, the ceramic heater to which the heating element formed on the ceramic base generates heat by the electric power supply, a metal resistance thin film, etc. in the shape of a base as exoergic members 11a and 11b is used.

[0133] This operation gestalt 9 has main exoergic member 11a which generates heat with the power supplied through the principal voltage control means 28 from the main power supply section 24, and auxiliary exoergic member 11b which generates heat with the power supplied through the charge-and-discharge change means 27 from auxiliary power 25, and can raise the skin temperature of a heating roller 1 to predetermined temperature.

[0134] With this operation gestalt 9, the halogen heater is used as exoergic members 11a and 11b. A halogen heater uses as heat the light irradiated from a halogen lamp, and even if the filament which consists of a tungsten evaporates, it has the description of being long lasting, by the halogen cycle which reacts with the halogen gas by which the closure was carried out, and returns into glass at a filament.

[0135] A main power supply 24 is connected with the plug socket which it has near the installation of this operation gestalt 9, and outputs the alternating current power from a source power supply, and many electrical-potential-difference power sources of 100V are usually used as a source power supply in Japan. Furthermore, a breaker falls with about [ 15A ] current capacity in many cases, and one circuit has the upper limit of power called 1500W at the maximum. A main power supply 24 not only connects with exoergic member 11a, but may have functions, such as adjustment of the electrical potential difference according to heating component 11a, and rectification of an alternating current and a direct current, stabilization of an electrical potential difference, through the principal voltage control means 28 simply.

[0136] Auxiliary power 25 is a power source in which charge and discharge are possible, and uses for auxiliary power 25 the electric double layer capacitor which is a mass capacitor with this operation gestalt. Since a capacitor is not accompanied by the chemical reaction unlike a rechargeable battery, it has above outstanding description (1) - (3), and it has the outstanding description of discharging further for a short time. A mass capacitor can discharge in a short time, power can be used up, and the electrical potential difference also falls gradually according to the amount of discharge.

[0137] With this operation gestalt 9, two or more capacitor cells of 500F and 2.5V are connected with a serial, and are used for the electric power supply to auxiliary exoergic member 11b as auxiliary power 25. This is checking that auxiliary power 25 is equipped with sufficient capacity to supply power to auxiliary exoergic member 11b for dozens seconds from several seconds. Moreover, the mass capacitor currently called under the name of the redox capacitor, the SHUDO capacitor, etc. besides the electric double layer capacitor may be used for auxiliary power 25.

[0138] While power is supplied to exoergic member 11a through the principal voltage control means 28 with this operation gestalt 9 from a main power supply 24, it is possible to supply power from auxiliary power 25 through the charge-and-discharge change means 27 also to exoergic member 11b. A lot of power exceeding the supply voltage by the main power supply 24 can be supplied to the exoergic member in a heating roller 11 by supplying power to coincidence from both a main power supply 24 and the auxiliary power 25 at the exoergic members 11a and 11b in the heating roller 11.

[0139] For this reason, rather than can shorten [ which used a main power supply 24 and auxiliary power 25 for coincidence ] time amount which goes up to the temperature to which the temperature of the heating roller 11 can be fixed as shown in drawing 12 only using a main power supply 24. And since [ whose auxiliary power 25 is predetermined ] the power supply declines if time amount discharge is carried out, it carries out actuation which is equipped with the safety device which intercepts power automatically. for this reason, it is possible for it to be

markedly alike and to make insurance shorten a heating up time rather than the configuration which increases the power of a main power supply 24 simply in the anchorage device using a main power supply 24 and auxiliary power 25.

[0140] Drawing 14 shows the example of this operation gestalt 9 of operation. A high-speed temperature up is possible for this operation gestalt 9 as mentioned above, and it is short. [ of the charging time of auxiliary power 25 ] When the auxiliary power 25 which consists of a mass capacitor in which boosting charge, such as an electric double layer capacitor, is possible is not fully charged, at the time of a temperature up, power is supplied to heating component 11a only from a main power supply 24 first thing in the morning when the power source of this operation gestalt 9 is switched on first thing in the morning. And in the standby condition which does not have to make temperature of heating component 11a high, power is supplied to auxiliary power 25 through a battery charger 26 and the charge-and-discharge change means 27 from a main power supply 24, and auxiliary power 25 is charged.

[0141] next, when carrying out the temperature up of the temperature of a heating roller 11 and a lot of power is needed The principal voltage control means 28 and the charge-and-discharge change means 27 are minded from a main power supply 24 and auxiliary power 25. To coincidence Exoergic member 11a, The temperature of the heating roller 11 rises for a short time by power being supplied to 11b and more total power supplied to the exoergic members 11a and 11b than the time of the electric power supply of only a main power supply 24 being supplied. Thus, with a rechargeable battery, the effectiveness which was not acquired can be acquired by using a capacitor as auxiliary power 25.

[0142] For example, the heating roller which was possible for the temperature up to predetermined temperature is conventionally explained in 30 seconds. When using an iron fixing roller with a thickness of 0.7mm for the diameter of 50mm as a conventional heating roller, with the halogen heater of 1200w usually used as a heating component with the conventional anchorage device although the temperature of a heating roller is raised to the predetermined temperature of about 180 degrees C, the temperature up of the above-mentioned heating roller was able to be carried out in about 30 seconds.

[0143] Moreover, the electric double layer capacitor as auxiliary power is charged at the high voltage, and the example which uses the exoergic member by which supply current was restricted to 12A is explained. As for a halogen heater, maximum current is restricted. For this reason, when an electric double layer capacitor is charged 50V, the power of  $12A \times 50V$ , 600 [ i.e., ], w can be taken out from an electric double layer capacitor. When the power of 600w of auxiliary power was supplied to 1200w of a source power supply, and coincidence at a halogen heater, the power of 1800w will be supplied to a halogen heater, and the heating up time of the heating roller which was 30 seconds conventionally was shortened at about 20 seconds.

[0144] However, two or more capacitor cels which can charge 2.5V are connected to a serial, and in charging 50V and using this for the electric power supply to a halogen heater, there is a problem on electric insurance. That is, since it has the high voltage power supply of about 50 V in image formation equipment, in case a user or a maintenance check operator accesses inside equipment, there is a possibility of receiving an electric shock when the terminal area of high potential has been touched.

[0145] According to the "electric work specialist textbook" which Japan Electric Association has published, by DC power supplies, such as a capacitor, it carries out "it is \*\*\*\*\* for a while" by electrification of about 3.5mA current, and it is supposed that there is "a shock without pain" by electrification of about 6mA. Since human being's resistance is 5-10kohm, human being is supposed that electric shock may be received by above-mentioned electrification 18-35V, and 30-60V, respectively. For this reason, the capacitor cel which can charge 2.5V with the above-mentioned configuration will be connected to a 20-piece serial, and the capacitor which charged this 50V when 50V were charged will give a shock of electrification to the user who touched accidentally.

[0146] With this operation gestalt 9, the resistor 31 which is electrical load is connected through the means for switching 32 as an alternative connecting means between the terminals of auxiliary power 25, and the means for switching 32 is usually in the release condition. If a means for switching 32 will be in a closing condition by predetermined directions actuation, between the terminals of auxiliary power 25, a resistor 31 will be connected, power will be supplied from auxiliary power 25 to a resistor 31, and the electrical potential difference of auxiliary power 25 will descend. It is good also as a configuration which radiates heat efficiently and does not damage the heat which attached electrical loads, such as a fin, instead of the resistor 31, and was generated with this electrical load.

[0147] The directions to a means for switching 32 For example, do because the access detection means (a detection means to detect interior access of equipment of a user and a maintenance operator) and means for switching 32 of covering of the case (auxiliary power 25 etc. is contained by this case) currently installed from the former, such as a closing motion detection switch, interlock. An access detection means operates by opening a case, a means for

switching 32 changes to a closing condition with the access detection signal, and power is supplied to a resistor 31 from auxiliary power 25. the directions to a means for switching 32 -- in addition, do with access detection means, such as an open/close switch of the member opened and closed in case a user and a maintenance operator access to the terminal to which potential is high by auxiliary power 3, -- in case a user and a maintenance operator access the high potential section, it is good also as a configuration which the detection signal of an access detection means generates as directions of the discharge to a means for switching 32 automatically.

[0148] With this operation gestalt 9, if the about 13-ohm resistor 31 is used and the electrical potential difference of auxiliary power 25 is made to discharge to a resistor 31 by closing of a means for switching 32, it can be made to be able to fall to 30V from 50V in about 2.5 minutes, and can lower even to the level which does not receive the electric shock in which human being has a shock in the electrical potential difference of the electric power supply terminal of auxiliary power 25. Moreover, since a user and a maintenance operator do not need to direct intentionally the discharge to a resistor 31 from auxiliary power 25, they forget carelessly, do not receive an electric shock, and are desirable from insurance. Thus, according to this operation gestalt 9, electrification can be prevented by lowering the output voltage of auxiliary power to the electrical potential difference which does not receive an electric shock even if people touch accidentally, and safety is high. Moreover, access inside [ of an operator ] equipment can be detected automatically, an electrical potential difference can be reduced compulsorily, and fear of electrification can realize little safe heating apparatus. Furthermore, less than [ 200V ], auxiliary power with higher safety is realizable, having the same electric power supply engine performance on the same electrical potential difference, since a direct current cannot flow the body easily and has one about 4 times the safety of this rather than an alternating current.

[0149] Drawing 15 shows the circuitry of the anchorage device in the operation gestalt 10 of this invention. With this operation gestalt 10, in the above-mentioned operation gestalt 9, the input side of the DC/AC converter 33 is connected to auxiliary power 25 through the charge-and-discharge means for switching 27 and a means for switching 32, and the output side of this DC/AC converter 33 is connected to exoergic member 11b. A resistor 31 is omitted. Conversely [ the above-mentioned operation gestalt 9 ], the means for switching 32 is usually closed and will be in a closing condition by predetermined directions actuation by access detection means, such as a closing motion detection switch of covering of a case (auxiliary power 25 etc. is contained by this case).

[0150] The direct current power from the auxiliary power 25 which is DC power supply is changed into alternating current power by the DC/AC converter 33 through the charge-and-discharge means for switching 27 and a means for switching 32, and is supplied to auxiliary exoergic member 11b. To the output of auxiliary power 25, electrical potential differences, such as a pressure up or pressure lowering, can be changed, or the DC/AC converter 33 can carry out DC/AC conversion simply, and does not ask the function especially about transformation. Here, the DC/AC converter 33 changes the direct current voltage of auxiliary power 25-50V into the alternating voltage of 50V. The means for switching 32 which turns on / turns off the electric power supply to auxiliary exoergic member 11b is installed in the DC circuit of the input side of the DC/AC converter 33, and is installed in AC circuit of the output side of the DC/AC converter 33 in the example 3 of a comparison of an anchorage device as shown in drawing 16.

[0151] An operation and effectiveness of this operation gestalt 10 are explained below. Here, the potential of each part in the idle state to which the means for switching 32 became off is considered. When the means for switching 32 is formed in the DC circuit like this operation gestalt 10, a user and a maintenance operator touch a circuit and each part of DC time road side receives an electric shock of the high potential of 50V. Since power is not supplied to the DC/AC converter 33, potential is 0, and an electric shock of AC circuit is not received.

[0152] When the means for switching 32 is formed in AC circuit like the above-mentioned example 3 of a comparison, a user and a maintenance operator touch a circuit and each part of AC circuit and each part of a DC circuit receive an electric shock of the high potential of 50V. That is, although fear of electrification with the direct current voltage of 50V has this operation gestalt 10 and the example 3 of a comparison, there is no fear of electrification [ with this operation gestalt 10 ] with the alternating voltage of 50V.

[0153] According to the "electric work specialist textbook" which Japan Electric Association has published, the danger to electrification differs by a direct current and alternating current also on the same electrical potential difference, and it is shown clearly that an alternating current has the danger of being about 4 times much as a direct current. By DC power supply, as shown in drawing 20, it carries out "it is \*\*\*\*\* for a while" with about 3.5mA current, and by AC power supply, "a shock without pain" is fully got with about 3.5mA current to there being "a shock without pain" by about 6mA, and it becomes "a shock accompanied by pain" in about 6mA.

[0154] Although human being may receive electric shock by 18-35V, and 30-60V, respectively since resistance is 5-10kohm, the danger becomes risk about about 4 times in an alternating current. For this reason, with this operation gestalt 10, even when human being has received electric shock, it means receiving the electric shock by

direct current, and it becomes possible to raise the safety to the body.

[0155] Thus, according to this operation gestalt 10, less than [ 200V ], auxiliary power with higher safety is realizable, having the same electric power supply engine performance on the same electrical potential difference, since a direct current cannot flow the body easily and has one about 4 times the safety of this rather than an alternating current.

[0156] Drawing 17 shows the circuitry of the anchorage device in the operation gestalt 11 of this invention. With this operation gestalt 11, electrical load for making auxiliary power 25 discharge is set to auxiliary exoergic member 11b which is a resistance heating element in the above-mentioned operation gestalt 9. The halogen heater is used for auxiliary exoergic member 11b, and the output of 600w is possible for it.

[0157] As compared with the mere resistor 31 of the above-mentioned operation gestalt 9, since discharge with large power is possible, auxiliary exoergic member 11b can reduce the electrical potential difference of auxiliary power 25 for a short time. For example, in the auxiliary power 25 of 600w, the pressure can be lowered from 50V to 30V in about 1 minute, and a charging time value required for pressure lowering of auxiliary power 25 can be shortened about to 1/3. Furthermore, when the 1200w output of auxiliary power 25 is possible, pressure lowering of auxiliary power 25 is possible in 30 seconds.

[0158] With this operation gestalt 11, there is also an advantage to which the cure to generation of heat can be managed with using auxiliary exoergic member 11b as an electric load which makes auxiliary power 25 discharge by the minimum. It is designed from the first supposing auxiliary exoergic member 11b becoming an elevated temperature, and even if auxiliary exoergic member 11b becomes an elevated temperature, the equipment for cooling this can be substituted for minimum.

[0159] Since the temperature of a heating roller 11 was raised to about 120 degrees C at the maximum when the auxiliary power 25 of 50V and 25F is made to discharge alone in this operation gestalt 11, especially temperature control did not need to be put in and safe discharge was thermally possible. Thereby, safe heating apparatus can be realized, without equipment becoming complicated.

[0160] And a maintenance worker directs ON / off actuation of discharge of auxiliary power 25 actively. For example, the control panel of a copying machine is equipped with the special setting screen mode which only a maintenance worker can set up in many cases, and it is the same also with this operation gestalt 11. With this operation gestalt 11, in case the activity whose maintenance worker may access internal equipment and may touch the high-voltage terminal of auxiliary power 25 is done, in the special setting screen mode, a maintenance worker reduces the electrical potential difference of auxiliary power 25 actively, that is, the electrical potential difference of auxiliary power 25 is reduced by making the charge-and-discharge means for switching 27 changed to the exoergic member 11b side, and making it discharge from auxiliary power 25 to exoergic member 11b. When the safety to the terminal which becomes a high voltage is fully held by the usual activity by this, it becomes possible to press down useless discharge of auxiliary power 25.

[0161] Thus, according to this operation gestalt 11, electrification can be prevented and safety is high. Since permissible power of a resistor is small, a charging time value is long, and when an operator accesses the interior for a short time, the electrical potential difference of auxiliary power 25 may not fully have fallen yet. However, the resistance of electrical load can be made small by setting electrical load for making auxiliary power 25 discharge to exoergic member 11b which is a resistance heating element, and the charging time value of auxiliary power 25 can be shortened. For this reason, the electrical potential difference of auxiliary power 25 can be dropped in a short time, and safe equipment can be offered.

[0162] Moreover, while power will become useless if auxiliary power discharges only by detecting access to the interior, such as closing motion of a door, when a user cannot access carelessly but is installing auxiliary power in the situation that danger is low, subsequent starting takes time amount and a user's convenience is spoiled. However, in case a maintenance worker carries out a maintenance service, by reducing the electrical potential difference of auxiliary power 25 to the actuation performed actively, useless discharge actuation of auxiliary power 25 is lost, energy expenditure can be lessened, and a user's user-friendly equipment can be offered. In addition, it is [ generation of heat of the recording paper ] reliable in order that a heating roller 11 may not exceed 180 degrees C, even if it makes auxiliary power 25 discharge completely depending on the capacity of auxiliary power 25.

[0163] Drawing 18 shows the circuitry of the anchorage device in the operation gestalt 12 of this invention. With this operation gestalt 12, the motor 34 is used instead of the resistor 31 in the above-mentioned operation gestalt 9 as an electric load which makes auxiliary power 25 discharge. It is possible to drop the electrical potential difference of auxiliary power 25 by this, pressing down generation of heat inside equipment.

[0164] Thus, since according to the operation gestalt 12 it is except electric generation of heat and energy is consumed, it is possible to make it discharge from auxiliary power, without raising the member temperature of equipment. For this reason, though the recording paper remains in the interior of equipment because of the record

paper jam, it is possible to drop the electrical potential difference of auxiliary power, without raising recording paper temperature. since generation of heat is boiled markedly and can be made small as compared with the case where a resistor is used as an electric load which makes auxiliary power 25 discharge, even if the recording paper etc. remains in the interior, such as an anchorage device, there is no temperature rise which exceeds the recording paper ignition point (about 300 degrees C), and safe equipment can be offered to ignition.

[0165] Drawing 19 shows the auxiliary power in the operation gestalt 13 of this invention. In the above-mentioned operation gestalt 9, auxiliary power 25 connects to a serial two or more auxiliary power modules 25a and 25b which connected two or more capacitor cels 251,252 and 253,254 to the serial, respectively through a means for switching 32, and consists of this operation gestalt 13. However, one or plurality is sufficient as the capacitor cels 251,252 and 253,254 held in auxiliary power module 25a and 25b, and even if it connects with juxtaposition, they are not cared about.

[0166] Although the auxiliary power modules 25a and 25b are connected to a serial through a means for switching 32 and a large electrical potential difference is supplied to exoergic member 11b, an electrical potential difference is supplied to exoergic member 11b from the auxiliary power module of one of these by a means for switching 32 separating connection of the auxiliary power modules 25a and 25b with predetermined directions, and only one of these being connected to exoergic member 11b. The means for switching 32 has usually connected the auxiliary power modules 25a and 25b to a serial, separates connection of the auxiliary power modules 25a and 25b in predetermined access actuation with access detection means, such as a closing motion detection switch of covering of a case (auxiliary power 25 etc. is contained by this case), and connects only one of these to exoergic member 11b.

[0167] In this example 13 of an operation gestalt, it considers as the auxiliary power of 50V by connecting the capacitor cel of 500F and 2.5V to a ten-piece serial, for example, considering as the auxiliary power module of 25V, and making this auxiliary power module into a serial through the two means for switching 32 further. Although especially the capacitor cel inside auxiliary power module 25a and 25b is unseparable, connection is separated to arbitration by the means for switching 32, and auxiliary power module 25a and 25b can connect only one of these to exoergic member 11b.

[0168] The actuation which separates the auxiliary power modules 25a and 25b, and connects only one of these to exoergic member 11b by making it such a configuration in case a maintenance worker and a user access the interior of image formation equipment is attained. That is, when the terminal potential of the auxiliary power 25 which was 50V in case power was supplied to exoergic member 11b from auxiliary power 25 separates the auxiliary power modules 25a and 25b by the means for switching 32 and connects only one of these to exoergic member 11b, it will fall to 25V of one half, and it can be lowered to potential without the risk of electrification in an instant.

[0169] In this case, although the division-into-equal-parts rate of the terminal potential of 50V of auxiliary power 25 is carried out to two, it may make still lower the auxiliary power module electrical potential difference per piece or more by dividing into three, and may make it a different auxiliary power module electrical potential difference' like 20V and 30V. According to the above methods, even if it uses the auxiliary power of fuel cell subsystems other than capacitors with which the fall of an electrical potential difference does not occur even if it discharges, such as a lithium ion battery, it is possible to take a safe configuration.

[0170] Thus, according to this operation gestalt 13, it is possible to divide high full voltage into the auxiliary power module of two or more low electrical potential differences by dividing auxiliary power 25 into two or more auxiliary power modules. The equipment whose activity can drop the electrical potential difference in the power output terminal of auxiliary power, and does not have fear of electrification by this, and is possible for insurance is realizable. In this case, since it is not accompanied by discharge of auxiliary power, the time amount changed into a safe condition is short, and there is no loss of power. Moreover, even if it uses the fuel cell subsystem to which an electrical potential difference does not fall even if lithium ion batteries, fuel cells, etc. other than a capacitor discharge as auxiliary power 25, the equipment whose activity is possible for insurance without fear of electrification is realizable.

[0171] Drawing 21 shows the circuitry of the anchorage device in the operation gestalt 14 of this invention. With this operation gestalt 14, in the above-mentioned operation gestalt 9, a resistor 31 and a means for switching 32 are omitted, and the pressure-up means 35 is established. The input side of this pressure-up means 35 is connected to auxiliary power 25 through the charge-and-discharge change means 27, and the output side of the pressure-up means 35 is connected to exoergic member 11b.

[0172] Auxiliary power 25 connects two or more capacitor cels of 1300F and 2.5V to a serial, and is constituted. The pressure up of the power from auxiliary power 25 is carried out by the pressure-up means 35 through the charge-and-discharge change means 27, and it is supplied to exoergic member 11b. Drawing 22 shows the example of this operation gestalt 14 of operation. The high-speed temperature up of a heating roller 11 is possible for this

operation gestalt 14, and it is short. [ of the charging time of auxiliary power 25 ] At the time of a temperature up, power is supplied to exoergic member 11a only from a source power supply first thing in the morning when the auxiliary power 25 which consists of a mass capacitor in which boosting charge, such as an electric double layer capacitor, is possible switches on a power source (main power supply 24) first thing in the morning when it does not fully charge. And in the standby condition which does not have to make temperature of a heating roller 11 high, it charges from the main power supply 24 by supplying power to auxiliary power 25 through a battery charger 26 and the charge-and-discharge means for switching 27.

[0173] and when carrying out the temperature up of the temperature of a heating roller 11 next and a lot of power is needed Power is supplied to exoergic member 11b through the charge-and-discharge change means 27 and the pressure-up means 35 from auxiliary power 25 at the same time power is supplied to exoergic member 11a through the principal voltage control means 28 from a main power supply 24. The temperature of the heating roller 11 rises for a short time by supplying more total power supplied to a heating component than the time only of the power from a main power supply 24.

[0174] When a capacitor is used as auxiliary power 25, using up the predetermined power of auxiliary power 25 as an important description is mentioned, and it can offer the configuration which realizes the short-time temperature up of the heating roller 11 safely by this. As an approach of increasing simply the power supplied to a heating roller, a power source is made into two lines, power is increased or using a rechargeable battery, a fuel cell, etc. is also considered. When the heating up time of a heating roller becomes short, the reaction time of these safety circuits is late, and stops catching up with the programming rate of a heating roller, although the safety device which a power circuit is directly intercepted [ safety device ] by safety circuits, such as a thermal fuse and a thermostat, and terminates an electric power supply is indispensable by these approaches when a system hangs up. For this reason, when a safety circuit operates, the temperature of a heating roller becomes high too much, and when the worst, the recording paper may ignite.

[0175] However, with the configuration using the capacitor as auxiliary power, even if a system hangs up, control stops hearing and the electric power supply from a capacitor to an exoergic member continues, if the predetermined power of a capacitor is used up, generation of heat of an exoergic member is completed and the temperature rise of a heating roller is stopped automatically. For this reason, compaction of the heating up time of a heating roller is realizable for insurance by using a capacitor as auxiliary power.

[0176] Thus, with a rechargeable battery, the effectiveness which was not acquired can be acquired by using a capacitor as auxiliary power of an anchorage device. For example, when the temperature up of the heating roller which was possible for the temperature up to predetermined temperature was conventionally explained in 10 seconds and the fixing roller made from aluminum with a thickness of 1mm is used for the diameter of 30mm as a heating roller, a heating value required to raise the temperature of a heating roller to about 180 degrees C is about 12000J. Since the halogen heater usually used with the conventional anchorage device was able to supply the power of about 1200 W on the electrical potential difference of 100V, the temperature up of the above-mentioned heating roller was able to be carried out in about 10 seconds.

[0177] If the temperature up of the heating roller 11 at the time of using the electric double layer capacitor which connected two or more capacitors of 1300F and 2.5V to the serial as auxiliary power is explained, it will set in this operation gestalt 14. In the anchorage device of the configuration using the halogen heater with which the electric double layer capacitor of auxiliary power 25 is made into the high voltage of 50V, and maximum current is restricted to 12A as exoergic member 11b not using the pressure-up means 35 as shown in drawing 23 The power of 600w can be taken out from an electric double layer capacitor, the power of 1800w will be supplied to a heating roller 11 by this 600w and 1200w of a source power supply, and the heating up time of the heating roller 11 which was 10 seconds conventionally can be shortened at about 6 seconds.

[0178] However, with this \*\*\*\* equipment, since the pressure-up means 35 is not used, in order to use it by setting the capacitor cel of 2.5V to 50V in auxiliary power 25, it is necessary to connect about 20 capacitor cels to a serial. At this time, the energy which auxiliary power 25 holds becomes about 80000J. However, it does not pass over a heating value required to raise the temperature of a heating roller 11 to the 1/6, but just the energy that makes three capacitor cels a serial is enough as it. Furthermore, in supplying the power of 600W to a heating roller 11 for 10 seconds, it has taken out only about [ 6000J ] power from auxiliary power 25. This is about 8 a little less than% of energy 80000J which auxiliary power 25 holds.

[0179] Thus, while an excessive capacitor cel is needed only by connecting two or more capacitor cels to a serial simply, making an electrical potential difference high, and raising the electrical potential difference of auxiliary power in the anchorage device of the configuration using this as auxiliary power, it becomes difficult to take out the electrical energy to hold for a short time at the time of the temperature up of a heating roller 11, the capacitor cel of auxiliary power increases, the volume becomes large, and cost also goes up.



[0180] Next, in the anchorage device which supplies and uses the power which carried out the pressure up of the power from the electric double layer capacitor of auxiliary power using the pressure-up means for an exoergic member, it is possible to carry out the pressure up of the power from the auxiliary power of a low battery and a high current to the high voltage and low current using an IGBT component etc. with a pressure-up means. For example, although the power of 1200W will be obtained from auxiliary power if eight capacitor cels of 2.5V are connected to a serial like this operation gestalt 14, the auxiliary power of 20V is constituted and the output of this auxiliary power sets to 60A by 20V, this can be set to 12A by 100V using the pressure-up means 35. As power which the capacitor of auxiliary power holds, since it is set to 32500J in eight capacitor cels, when 1200W are used for 10 seconds, a little less than [ 12000J ] can be used by simple count. This is 36% of the standing losses of the capacitor of auxiliary power, and serves as 4.5 times as many improvement in use effectiveness as this compared with 8% at the time of connecting 20 capacitor cels to a serial simply.

[0181] Thus, bigger power is realizable in few capacitor cels using the pressure-up means 35. In the example of the above-mentioned anchorage device using eight capacitor cels, 1200W came to be obtained for that from which only 600W were conventionally obtained using 20 capacitor cels in eight capacitor cels. There are two big advantages by this. One of them is being able to obtain large power, and it can shorten the heating up time of a heating roller more. Two are that the number of capacitor cels becomes fewer, they can also reduce weight while they can reduce the volume of a capacitor cel, and they can reduce the cost of a capacitor cel sharply. In the anchorage device using this eight capacitor cel, the number of capacitor cels decreases to below one half compared with the anchorage device which uses the 20 above-mentioned capacitor cels.

[0182] Thus, although the power supplied to a heating roller was restricted to 1200w which was the upper limit of the electric power supply from the conventional source power supply In the anchorage device of the configuration which can shorten the heating up time of a heating roller by the power supplied to a heating roller being set to 1800w-2000w By making it the configuration made high with the pressure-up means 35, the supply voltage from auxiliary power 25 to exoergic member 11b like this operation gestalt 14 Since the number of a required capacitor cel can be reduced using without futility the energy which the capacitor of auxiliary power 25 holds, it is possible to reduce the volume of auxiliary power, to make an installation tooth space small further, and to reduce auxiliary power cost.

[0183] Thus, since according to this operation gestalt 14 the number of the capacitor cels which connect with the serial of auxiliary power 25 in order to secure the high electrical potential difference supplied to exoergic member 11b can be reduced and the volume of a capacitor can be reduced, the auxiliary power 25 for shortening the heating up time of a heating roller 11 can be miniaturized. Moreover, even if a system hangs up, after fixed time amount, the electric power supply from auxiliary power 25 to exoergic member 11b declines automatically, and since there is no risk of a heating roller 11 becoming an elevated temperature too much, the heating apparatus in which the safety at the time of a system overrun is high, and a short-time temperature up is possible is realizable.

[0184] Moreover, since the electrical potential difference to exoergic member 11b is high and it is possible to supply large power to exoergic member 11b even if the maximum current which flows to exoergic member 11b is small, it is possible to carry out the temperature up of the heating roller 11 for a short time. Moreover, since the maximum supply voltage exceeding a limit of the supply voltage of a source power supply can be supplied to heating apparatus, equipment with short build up time can be offered.

[0185] Drawing 24 shows a part of circuitry of the anchorage device in the operation gestalt 15 of this invention, and drawing 25 shows a time change of the input voltage  $V_{in}$  inputted into the pressure-up means 35 in this operation gestalt 15, and the output voltage  $V_{out}$  outputted to auxiliary exoergic member 11b from the pressure-up means 35, and a time change of the skin temperature of a heating roller 11. With this operation gestalt 15, it differs so that it may state below, and the above-mentioned operation gestalt 14 of others is the same.

[0186] What is necessary is just to enlarge the supply voltage to exoergic member 11b, in order to shorten the heating up time of a heating roller 11. For example, the source power supply of 200V may be used for the power unit which supplies power to exoergic member 11b, or constant voltage power supplies, such as a rechargeable battery, may be used for it. However, when the supply voltage to exoergic member 11b is enlarged not much too much, there is a problem that the temperature of a heating roller 11 will overshoot.

[0187] With this operation gestalt 15, on the property of the capacitor of auxiliary power 25, the input voltage  $V_{in}$  of the pressure-up means 35 declines as time amount passes. The scale factor of the pressure up which especially the output voltage  $V_{out}$  of the pressure-up means 35 did not control, but broke output voltage  $V_{out}$  by input voltage  $V_{in}$  to the input voltage  $V_{in}$  of this pressure-up means 35 is always fixed. For this reason, while a circuit is simplified, overshoot of the temperature of the heating roller 11 at the time of a temperature up can be prevented.

[0188] This does not need to prepare especially the detection means for control, in case the electrical potential difference of auxiliary power 25 falls, and also it is because it is not necessary to carry out control which

compensates the fall of input voltage  $V_{in}$  and gathers the scale factor of a pressure up. Moreover, since actuation which reduces the power to exoergic member 11b can be automatically performed if power is supplied to exoergic member 11b in the state of the low temperature of a heating roller 11 at full and the temperature of a heating roller 11 becomes high, overshoot of the temperature of a heating roller 11 can be reduced.

[0189] Since the power from auxiliary power 25 is consumed and its supply voltage to exoergic member 11b decreases as the temperature of a heating roller 11 goes up in case this raises the temperature of a heating roller 11 as shown in drawing 25, it is because the supply voltage to exoergic member 11a also including the supply voltage from a source power supply and the whole 11b can be reduced gradually. Thereby, it is immediately after electric supply starting to the exoergic members 11a and 11b, and in the condition that the heating roller 11 is low temperature, if discharge of auxiliary power 25 progresses and the temperature of a heating roller 11 becomes high while power can be supplied to the exoergic members 11a and 11b at full, the electrical potential difference of auxiliary power 25 will fall, and the supply voltage of auxiliary power 25 will decrease automatically.

[0190] Hereafter, this operation gestalt 15 is explained concretely. Auxiliary power 25 connects the capacitor cel of 1300F to an eight-piece serial, and the pressure-up means 35 carries out the pressure up of the early input voltage  $V_{in}$  of 20V to 100V, and presupposes that 1200W were supplied to auxiliary exoergic member 11b. If there is no loss of the pressure-up means 35 and it is fixed [ the scale factor of the pressure up of the pressure-up means 35 ], after 30 seconds, the input voltage  $V_{in}$  of the pressure-up means 35 will fall to 13V, and the power supplied to auxiliary exoergic member 11b will become about 400w. Therefore, if power to main exoergic member 11a is set to 1200w, what was 2400w when the temperature of a heating roller 11 was low will reduce the power supplied to exoergic member 11a and the whole 11b to about 1600w as the temperature of a heating roller 11 rises.

[0191] Therefore, with this operation gestalt 15, while the temperature of a heating roller which becomes with a problem in a configuration so that power may be increased by the constant voltage power supply as auxiliary power becomes possible [ reducing the overshoot of temperature which the climbing speed is quick and goes up too much to an elevated temperature ], since the power to auxiliary exoergic member 11b is large when the temperature of a heating roller 11 is low, there is effectiveness of enough also in heating-up-time compaction of a heating roller 11. Thus, according to this operation gestalt 15, since it is not necessary to carry out complicated control, simplification of a circuit and reduction of overshoot of the temperature of a heating roller 11 can be aimed at.

[0192] Drawing 26 shows the example of a time change of the input voltage  $V_{in}$  inputted into the pressure-up means 35 in the operation gestalt 16 of this invention, and the output voltage  $V_{out}$  outputted to auxiliary exoergic member 11b from the pressure-up means 35, and a time change of the temperature of a heating roller 11. With this operation gestalt 16, it differs so that it may state below, and the above-mentioned operation gestalt 14 of others is the same.

[0193] First, the case where the output voltage  $V_{out}$  of the pressure-up means 35 is not being controlled is considered. Auxiliary power 25 connects the capacitor cel of 1300F to an eight-piece serial, and the pressure-up means 35 carries out the pressure up of the early input voltage  $V_{in}$  of 20V to 100V, and presupposes that 1200W were supplied to auxiliary exoergic member 11b. If there is no loss of the pressure-up means 35 and it is fixed [ the scale factor of the pressure up of the pressure-up means 35 ], after 30 seconds, the input voltage  $V_{in}$  of the pressure-up means 35 will fall to 13V, and the power supplied to auxiliary exoergic member 11b will decline to about 400w.

[0194] Therefore, if power to main exoergic member 11a is set to 1200w, what was 2400w when the temperature of a heating roller 11 was low will reduce the power supplied to exoergic member 11a and the whole 11b to about 1600w as the temperature of a heating roller 11 rises. For this reason, it is good to shorten the heating up time of a heating roller 11 more to fix mostly the supply voltage to auxiliary exoergic member 11b into the electric supply time amount to auxiliary exoergic member 11b, as the output voltage  $V_{out}$  of the pressure-up means 35 becomes fixed.

[0195] So, with this operation gestalt 16, the pressure-up means 35 has the control means which performs control which gathers the scale factor of a pressure up as input voltage  $V_{in}$  declines to 13V. Thereby, the supply voltage to a heating roller 11 increases, and compaction of the heating up time of a heating roller 11 is attained. In addition, the above-mentioned control means may be prepared in the exterior of the pressure-up means 35. Thus, according to this operation gestalt 16, since big power can be supplied to exoergic member 11b, compaction of the heating up time of a heating roller 11 is attained. Drawing 27 shows the circuitry of the anchorage device in the operation gestalt 17 of this invention, and drawing 28 shows the outline of this anchorage device. With this operation gestalt 17, it differs so that it may state below, and the above-mentioned operation gestalt 14 of others is the same. Main exoergic member 11a and auxiliary exoergic member 11b heat the heating roller 11 which consists of a halogen heater and consists of a metal roller with radiant heat. Auxiliary exoergic member 11a has resistance smaller than main exoergic member 11a, and can pass a high current.



[0196] As for the base of a heating roller 11, it is desirable from points, such as endurance and deformation by pressurization, that they are metal, such as aluminum and iron. It is desirable to form the mold release layer for preventing fixing with a toner in the front face of a heating roller 11. the melanism for absorbing efficiently the heat of halogen heaters 11a and 11b in the inside of a heating roller 11 -- processing is desirable.

[0197] While main exoergic member 11a can obtain 1200W by passing 10A by 100V, auxiliary exoergic member 11b can obtain 1440W by passing 12A by 120V. Although the electrical potential difference to main exoergic member 11a will be decided by 100V of a source power supply, since the electrical potential difference to auxiliary exoergic member 11b can be made high by enlarging the setting scale factor of the pressure-up means 35, it can enlarge power to auxiliary exoergic member 11b. By using the halogen heater of auxiliary exoergic member 11b with the large power exceeding the supply voltage to main exoergic 11a, the heating up time of a heating roller 11 can be shortened. Moreover, it is possible to take out without futility the energy which auxiliary power 25 has for a short time.

[0198] Thus, according to this operation gestalt 17, since large power can be supplied to auxiliary exoergic member 11b, it is possible in a short time to use up the accumulation-of-electricity power of auxiliary power 25, and compaction of the heating up time of a heating roller 11 is possible. Moreover, since the electrical potential difference to halogen heater 11b is high, even if the maximum current which flows to halogen heater 11b is small, it is possible to supply large power to halogen heater 11b, and it is possible to carry out the temperature up of the heating roller 11 for a short time.

[0199] Drawing 29 shows the circuitry of the anchorage device in the operation gestalt 18 of this invention. With this operation gestalt 18, pressure-up means 35a is prepared instead of the pressure-up means 35 in the above-mentioned operation gestalt 14. The input side of this pressure-up means 35a is connected to auxiliary power 25 through the charge-and-discharge change means 27, and the output side of pressure-up means 35a is connected to exoergic member 11b.

[0200] Auxiliary power 25 connects two or more capacitor cels of 1300F and 2.5V to a serial, and is constituted. The pressure up of the power from auxiliary power 25 is carried out by pressure-up means 35a through the charge-and-discharge change means 27, and it is supplied to exoergic member 11b. The temperature detection means 36 detects the skin temperature of a heating roller 11. Pressure-up means 35a has the control means which controls which the pressure up of the input voltage from auxiliary power 25 is carried out to an electrical potential difference predetermined to predetermined timing, that is, raises the input voltage from auxiliary power 25 to which timing based on the detection signal from the temperature detection means 36. This control means may be prepared in the exterior of pressure-up means 35a.

[0201] As shown in drawing 30, pressure-up means 35a changes a pressure-up setup based on the information from a temperature detection means 36 to detect the temperature of the heating roller 11 with which it is heated by auxiliary exoergic member 11b in the above-mentioned control means, and temperature rises. Drawing 31 R> 1 shows a time change of the input voltage  $V_{in}$  inputted into pressure-up means 35a from auxiliary power 25, and the output voltage  $V_{out}$  outputted to auxiliary exoergic member 11b from pressure-up means 35a, and a time change of the temperature of a heating roller 11.

[0202] What is necessary is just to enlarge the supply voltage to auxiliary exoergic member 11b, in order to shorten the heating up time of a heating roller 11. For example, the source power supply of 200V can be used for the power unit which supplies power to auxiliary exoergic member 11b, or a constant voltage power supply, such as using a rechargeable battery, can also be used for it. However, when the supply voltage to auxiliary exoergic member 11b is enlarged not much too much, the detection time lag of the temperature detection means 36 poses a problem, and there is a problem that the temperature of a heating roller 11 will overshoot. Although it considers as the means which enlarges the supply voltage to auxiliary exoergic member 11b and the capacitor of auxiliary power 25 is used with this operation gestalt 18, in order to prevent temperature overshoot of a heating roller 11, pressure-up means 35a reduces output voltage  $V_{out}$  from a fixed electrical potential difference, when the temperature of a heating roller 11 turns into the predetermined laying temperature  $T_1$  in the above-mentioned control means.

[0203] For this reason, while being able to reduce overshoot of the temperature of a heating roller 11 certainly at the time of a temperature up, even if the temperature of the heating roller 11 in front of an electric power supply is what times, overshoot of the temperature of a heating roller 11 can be reduced. This functions effectively especially, when the temperature of the heating rollers 11 when the next man makes it work immediately after a certain man worked the image formation equipment of this operation gestalt 18 is higher than usual.

[0204] Thus, since according to this operation gestalt 18 the supply voltage to a heating roller 11 is lowered, the power supply to a heating roller 11 is lessened, when the temperature of a heating roller 11 is high, temperature detection of the exact heating roller 11 can be performed and the precision of feedback goes up even if the rapid temperature rise of a heating roller 11 is eased and there is a time lag of temperature detection of the temperature

detection means 36, overshoot of the temperature of the heating roller 11 can realize little short-time temperature up configuration safely.

[0205] Moreover, since the power supply from auxiliary power 25 to exoergic member 11b declines automatically after fixed time amount and risk of a heating roller 11 becoming an elevated temperature and the recording paper igniting can be reduced even if a system hangs up and ON/OFF control of the electric power supply to a heating roller 11 becomes impossible, the heating apparatus in which a short-time temperature up with the high safety at the time of a system overrun is possible is realizable.

[0206] Moreover, when the temperature of a heating roller 11 is high, the supply voltage to a heating roller 11 is lowered, and the power supply to exoergic member 11b is lessened. Since there is no time lag of temperature detection of the temperature detection means 36 and exact feedback is attained by this, overshoot of the temperature of the heating roller 11 can realize little short-time temperature up configuration safely.

[0207] Moreover, since exact feedback is attained by lowering the supply voltage to a heating roller 11, and lessening the power supply to exoergic member 11b even if there is a time lag of temperature detection of the temperature detection means 36 in case the temperature of a heating roller 11 rises and high temperature is reached, overshoot of the temperature of a heating roller 11 realizes little short-time temperature up configuration safely. Moreover, since the maximum supply voltage exceeding a limit of a source power supply can be supplied to heating apparatus, equipment with short build up time can be offered. Moreover, since the maximum supply voltage exceeding a limit of a source power supply can be supplied to heating apparatus, image formation equipment with the short build up time of heating apparatus can be offered.

[0208] Next, the operation gestalt 19 of this invention is explained. With this operation gestalt 19, a pressure-up means to have the control means to which a pressure-up setup is changed into based on the information on a temperature detection means 36 to detect the temperature of the heating roller 11 with which it is heated by auxiliary exoergic member 11b, and temperature rises instead of pressure-up means 35a, and output voltage  $V_{out}$  is changed gradually is used in the above-mentioned operation gestalt 18. Drawing 32 shows a time change of the input voltage  $V_{in}$  inputted into a pressure-up means from auxiliary power 25 in this operation gestalt 19, and the output voltage  $V_{out}$  outputted to auxiliary exoergic member 11b from a pressure-up means, and a time change of the temperature of a heating roller 11.

[0209] What is necessary is just to enlarge the supply voltage to exoergic member 11b, in order to shorten the heating up time of a heating roller 11. For example, the source power supply of 200V may be used for the power unit which supplies power to exoergic member 11b, or constant voltage power supplies, such as a rechargeable battery, may be used for it. However, when the supply voltage to exoergic member 11b is enlarged not much too much, the detection time lag of the temperature detection means 36 poses a problem, and there is a problem that the temperature of a heating roller 11 will overshoot. Although it considers as the means which enlarges the supply voltage to exoergic member 11b and the capacitor of auxiliary power 25 is used with this operation gestalt 19, in order to prevent temperature overshoot of a heating roller 11, a pressure-up means changes output voltage  $V_{out}$  low, when a heating roller 11 becomes the predetermined laying temperature  $T_1$  in the above-mentioned control means based on the detection signal from the temperature detection means 36.

[0210] For this reason, while being able to reduce overshoot of the temperature of a heating roller 11 certainly at the time of a temperature up, even if the temperature of the heating roller 11 in front of an electric power supply is what times, overshoot of the temperature of a heating roller 11 can be reduced. When the next man works this immediately after a certain man worked the image formation equipment of this operation gestalt 19, and the temperature of a heating roller 11 is high, it functions effectively especially. This operation gestalt 19 becomes possible [ reducing overshoot of the temperature of the heating roller 11 certainly ] while a circuit is simplified, since the output voltage  $V_{out}$  of a pressure-up means is not reduced gradually but is changed low.

[0211] Thus, since the output voltage  $V_{out}$  of a pressure-up means is lowered, the power supply to exoergic member 11b is lessened, when according to this operation gestalt 19 the temperature of a heating roller 11 rises and it becomes high temperature, there is no time lag of temperature detection of the temperature detection means 36 and exact feedback is attained, overshoot of the temperature of the heating roller 11 can realize little short-time temperature up configuration safely.

[0212] Next, the operation gestalt 20 of this invention is explained. With this operation gestalt 20, in the above-mentioned operation gestalt 19, as shown in drawing 34, pressure-up means 35b is used instead of the above-mentioned pressure-up means. Pressure-up means 35b has input voltage  $V_{in}$  and output voltage  $V_{out}$  almost equivalent to drawing 32. As shown in drawing 33, with this operation gestalt 20 pressure-up means 35b When the temperature of the heating roller 11 turns into the predetermined laying temperature  $T_1$  by changing a pressure-up setup based on the information from a temperature detection means 36 to detect the temperature of the heating roller 11 with which it is heated by auxiliary exoergic member 11b, and temperature rises, while changing output

voltage Vout low A pressure-up setup is changed based on the information from a remaining electricity force detection means 37 to detect the remaining electricity force of auxiliary power 25, and when the remaining electricity force of auxiliary power 25 is higher than the predetermined remaining electricity force, it has the control means which makes output voltage Vout low.

[0213] A time change of the input voltage Vin inputted into pressure-up means 35b from auxiliary power 25, the output voltage Vout outputted to auxiliary exoergic member 11b from pressure-up means 35b, and the temperature of a heating roller 11 is shown by drawing 33. If supply of the big power to auxiliary exoergic member 11b continues when the temperature of a heating roller 11 is high, if there is much remaining electricity force of auxiliary power 25, the temperature of a heating roller 11 will overshoot predetermined temperature. Then, in the above-mentioned control means, pressure-up means 35b detects the remaining electricity ability of auxiliary power 25 using the information from the remaining electricity force detection means 37, when the temperature of a heating roller 11 turns into the setting modification temperature Y1, and when the electric energy of auxiliary power 25 is larger than a predetermined value, it changes output voltage Vout low.

[0214] For this reason, while being able to reduce overshoot of the temperature of a heating roller 11 certainly at the time of a temperature up, even if the temperature of the heating roller 11 in front of an electric power supply is what times, when the remaining electricity force of auxiliary power 25 is large, overshoot of the temperature of a heating roller 11 can be reduced. This functions effectively especially, when the temperature of the heating rollers 11 when the next man makes it work immediately after a certain man worked the image formation equipment of this operation gestalt 20 is higher than usual. Moreover, since pressure-up means 35b changes it low rather than reduces output voltage Vout gradually, while a circuit is simplified, it becomes possible to reduce overshoot of the temperature of the heating roller 11 certainly.

[0215] Thus, since according to this operation gestalt 20 the electrical potential difference will be lowered, the power supply to auxiliary exoergic member 11b will be lessened, if the electrical potential difference of auxiliary power 25 is a high voltage, there is no time lag of temperature detection of the temperature detection means 36 and exact feedback is attained, overshoot of the temperature of the heating roller 11 can realize little short-time temperature up configuration safely.

[0216] In addition, this invention may not be limited to the above-mentioned operation gestalt, and a heating unit may be a fixing belt etc. Moreover, this invention can apply the electrical and electric equipment to the heating apparatus which makes into the main energy source also except an anchorage device, for example, can apply to heating apparatus, such as the equipment which heats sheet-like heated objects, such as a transfer paper which supported the image, and reforms the front-face nature (luster etc.), the equipment which carries out assumption arrival of the toner on a sheet-like heated object, and equipment which feeds paper to a sheet-like object and carry out desiccation processing / lamination processing.

[0217]

[Effect of the Invention] As mentioned above, according to this invention, temperature fluctuation of a heating unit can be made small and as many maintenance energy of a capacitor as possible can be used. Moreover, temperature fluctuation can be made small and build up time can be shortened. Moreover, a temperature rise can be made quick and temperature fluctuation can be made small. Moreover, high definition can be secured and high-definition-izing and improvement in the speed can be reconciled. Moreover, the separability of a heating unit and a toner image can be raised. Moreover, the nonuniformity of an image can be lost and output quality can be made high.

[0218] Moreover, electrification can be prevented by lowering the output voltage of an auxiliary power source, and safety is high. Moreover, the charging time value of auxiliary power can be shortened and a safe anchorage device can be offered. Moreover, there is no useless discharge actuation of auxiliary power, and there is little energy expenditure and it can offer a user's user-friendly equipment. Moreover, it is possible to make it discharge from auxiliary power, without raising the member temperature of equipment. Moreover, the auxiliary power for shortening the heating up time of a heating component can be miniaturized.

[0219] Moreover, the heating apparatus in which the safety at the time of a system overrun is high, and a short-time temperature up is possible is realizable. Moreover, it is possible in a short time to carry out the temperature up of the heating component, and build up time can offer short equipment. Moreover, simplification of a circuit and reduction of overshoot of the temperature of a heating component can be aimed at. Moreover, overshoot of the temperature of a heating component can realize little short-time temperature up configuration safely. Moreover, the equipment whose activity is possible for insurance without fear of electrification is realizable. Moreover, the heating apparatus in which a short-time temperature up with the high safety at the time of a system overrun is possible is realizable.

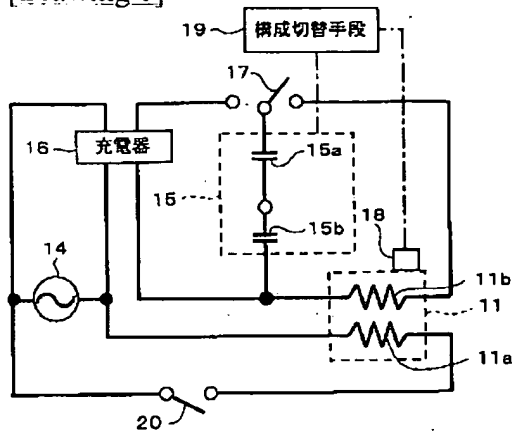
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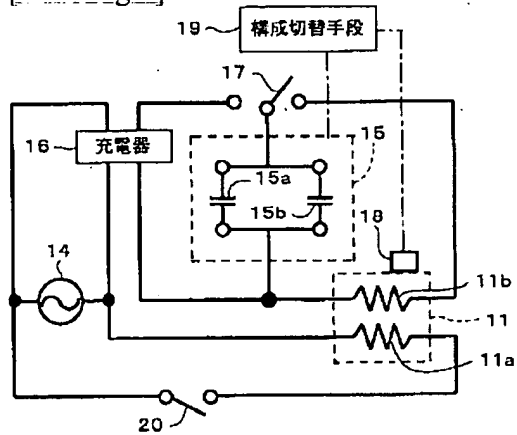
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

## DRAWINGS

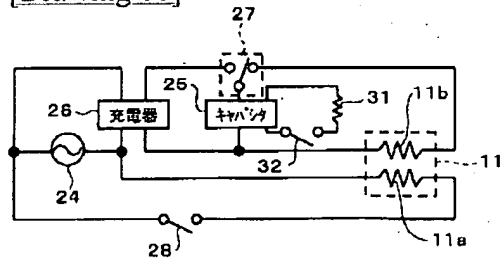
[Drawing\_1]



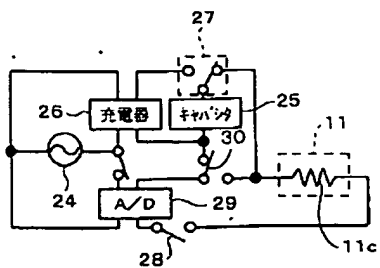
[Drawing 2]



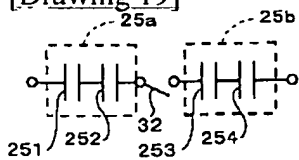
[Drawing 11]



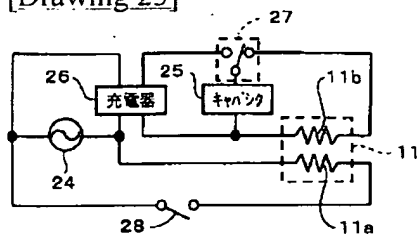
[Drawing 13]



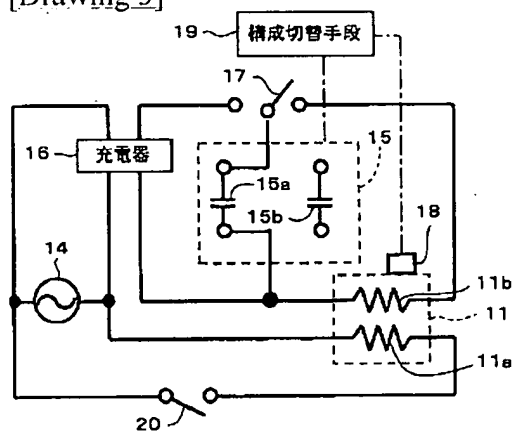
[Drawing 19]



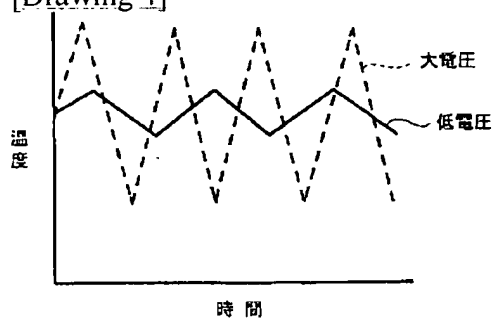
[Drawing 23]



[Drawing 3]



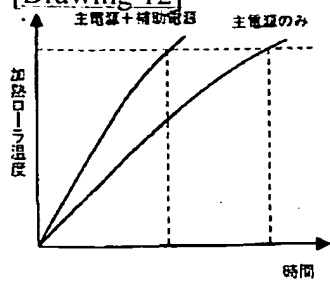
[Drawing 4]



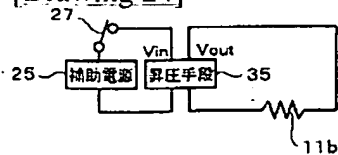
[Drawing 5]



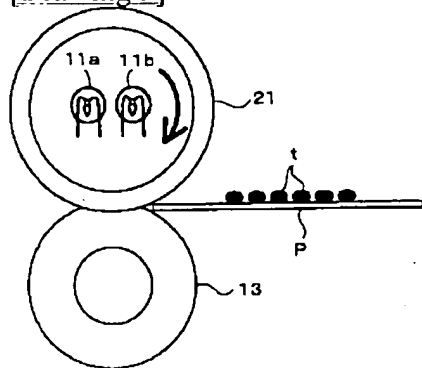
[Drawing 12]



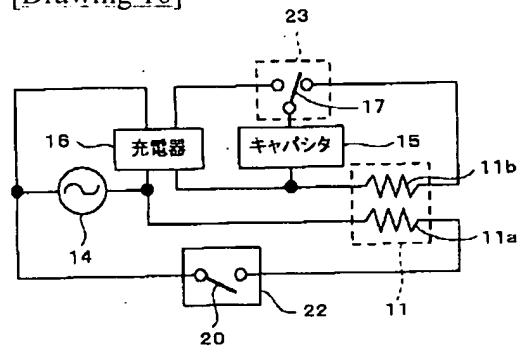
[Drawing 24]



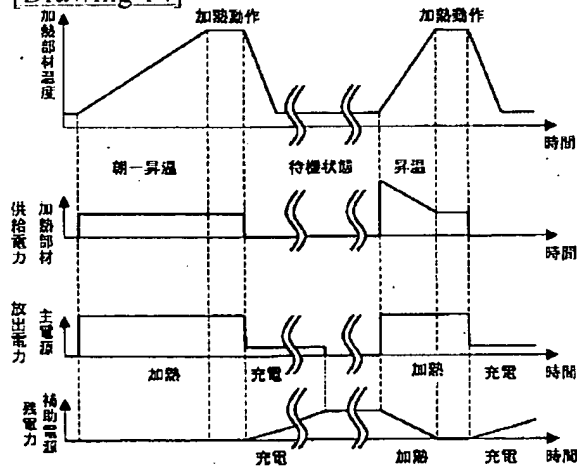
[Drawing 9]



[Drawing 10]

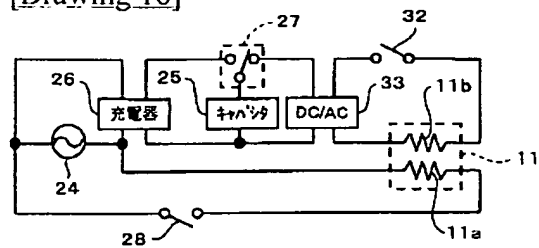


[Drawing 14]

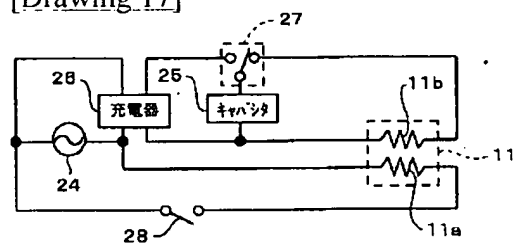


[Drawing 15]

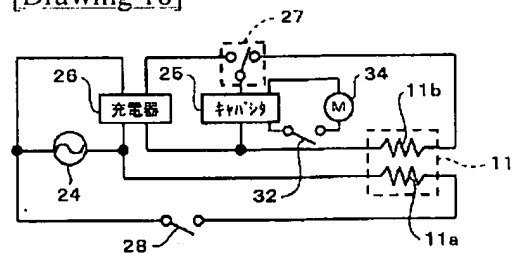
[Drawing 16]



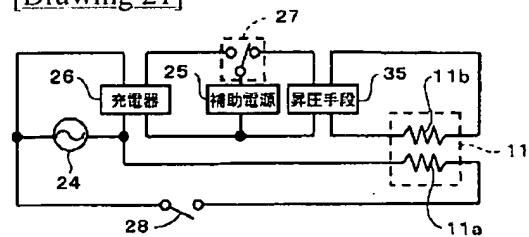
[Drawing 17]



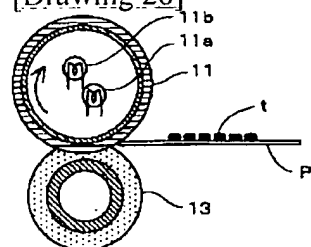
[Drawing 18]



[Drawing 21]



[Drawing 28]

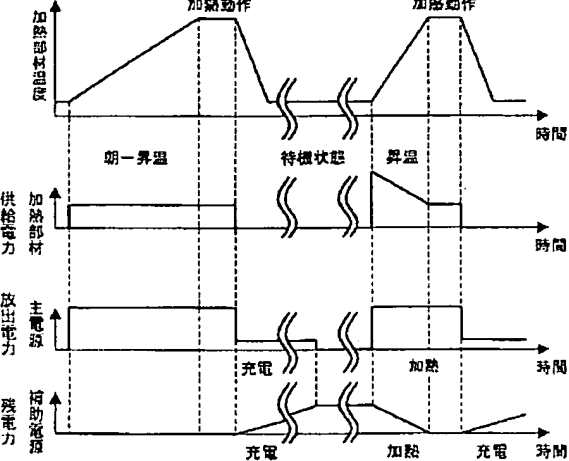


[Drawing 20]

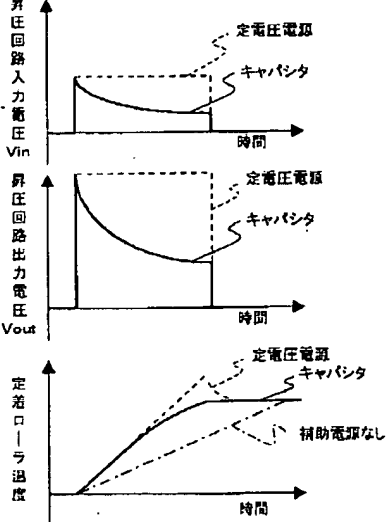


人体に対する電流の作用(実験値)						
電撃の影響	直流		交流			
			60Hz		10000Hz	
	男子 mA	女子 mA	男子 mA	女子 mA	男子 mA	女子 mA
感知電流、少しちくちくする	5.2	3.5	1.1	0.7	12	8
苦痛を伴わないショック、 筋肉の自由がきく	9	6	1.8	1.2	17	11
苦痛を伴うショック、ただし、 筋肉の自由がきく	62	41	9	6	55	37
苦痛を伴うショック、 腱脱の限界	74	50	16	10.5	75	50
苦痛を伴うばげしいショック、 筋肉硬直、呼吸困難	—	—	23	15	94	63
心室細動の可能性有り、 通電時間 0.03sec	1300	1300	1000	1000	1100	1100
心室細動の可能性有り、 通電時間 3.0sec	500	500	100	100	500	500
心室細動が確実に発生する	上記の値を2.75倍する					

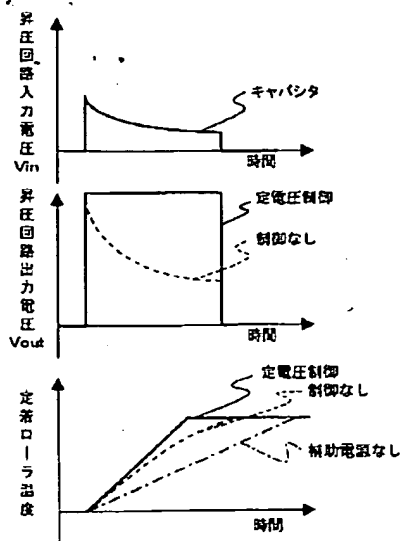
[Drawing 22]



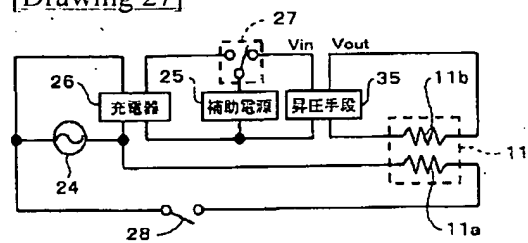
[Drawing 25]



[Drawing 26]



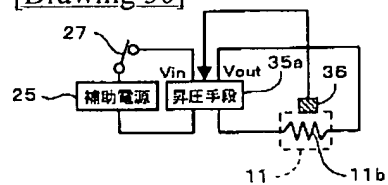
[Drawing 27]



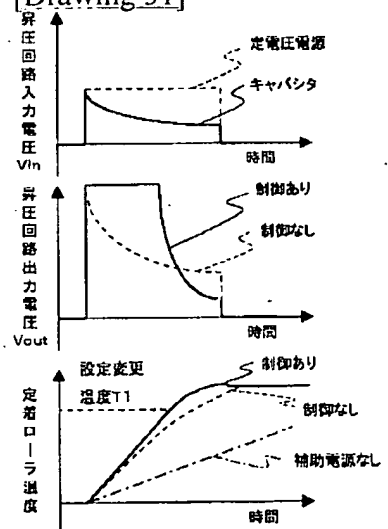
[Drawing 29]

× ID=000031

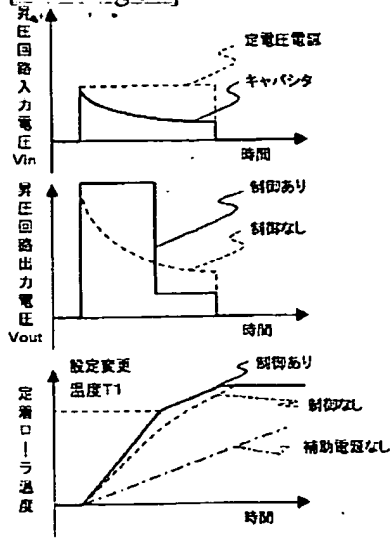
[Drawing 30]



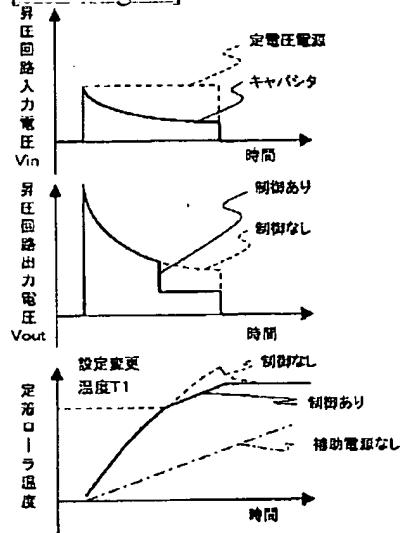
[Drawing 31]



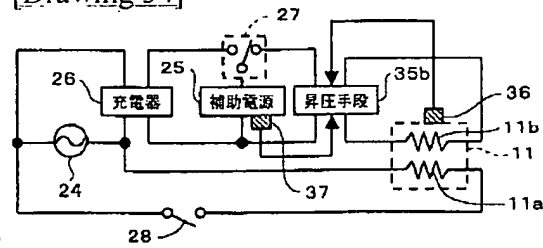
[Drawing 32]



[Drawing 33]



[Drawing 34]



[Translation done.]